CHILDREN'S TELEVISION WORKSHOP PREMIERE ISSUE

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THE WORLD OF COMPUTERS AND ELECTRONIC GAMES OCTOBER, 1983

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The Reality Behind 'WarGames'
And 'Superman III'

VIDEO GAMES

The Fall's Biggest Hits—
Home and Arcade

PLUS:

Matthew Broderick
Computer-Buyer's Guide
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SUPERS

Its arcade games look and sound so real it seems an illusion to have them at home.

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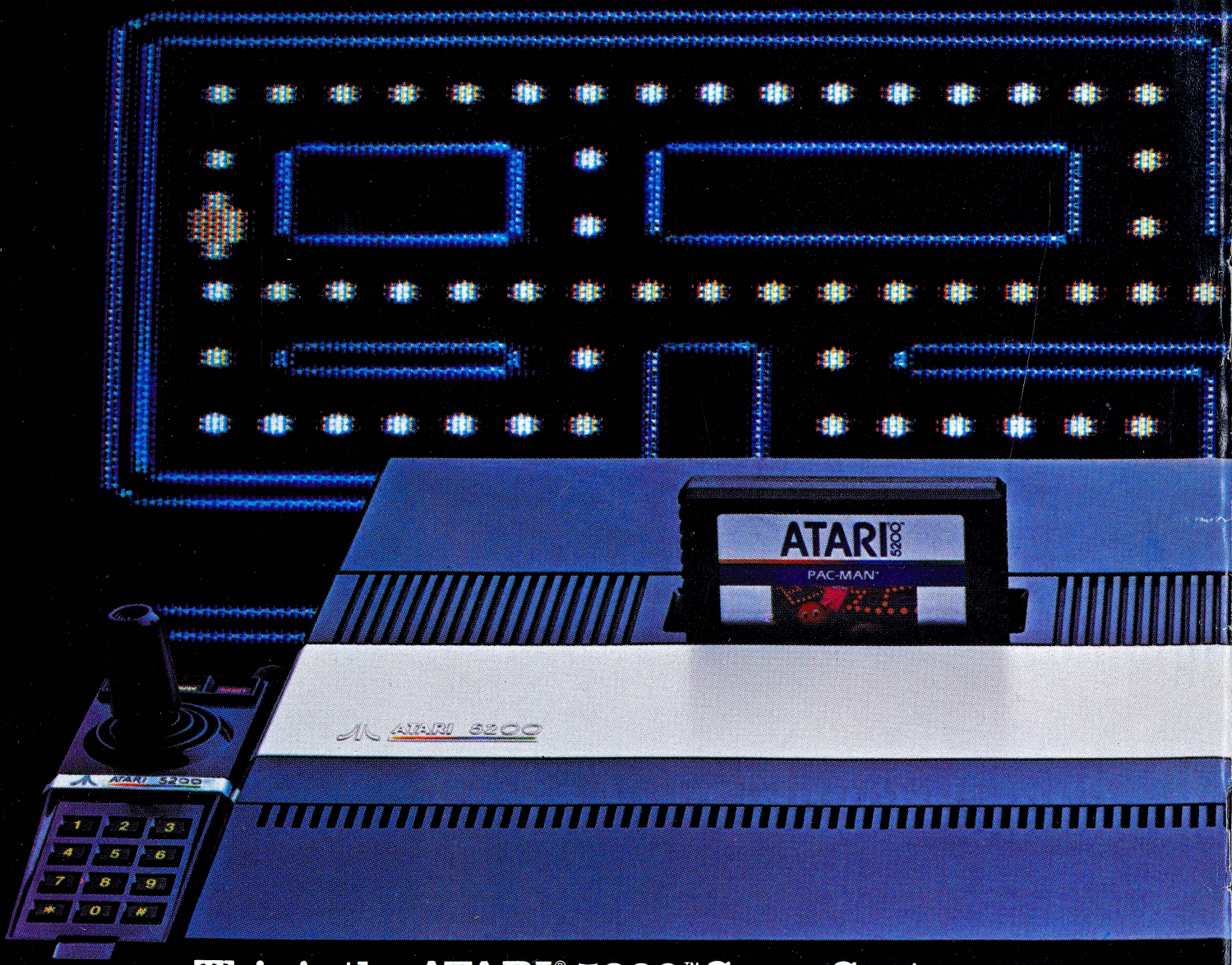

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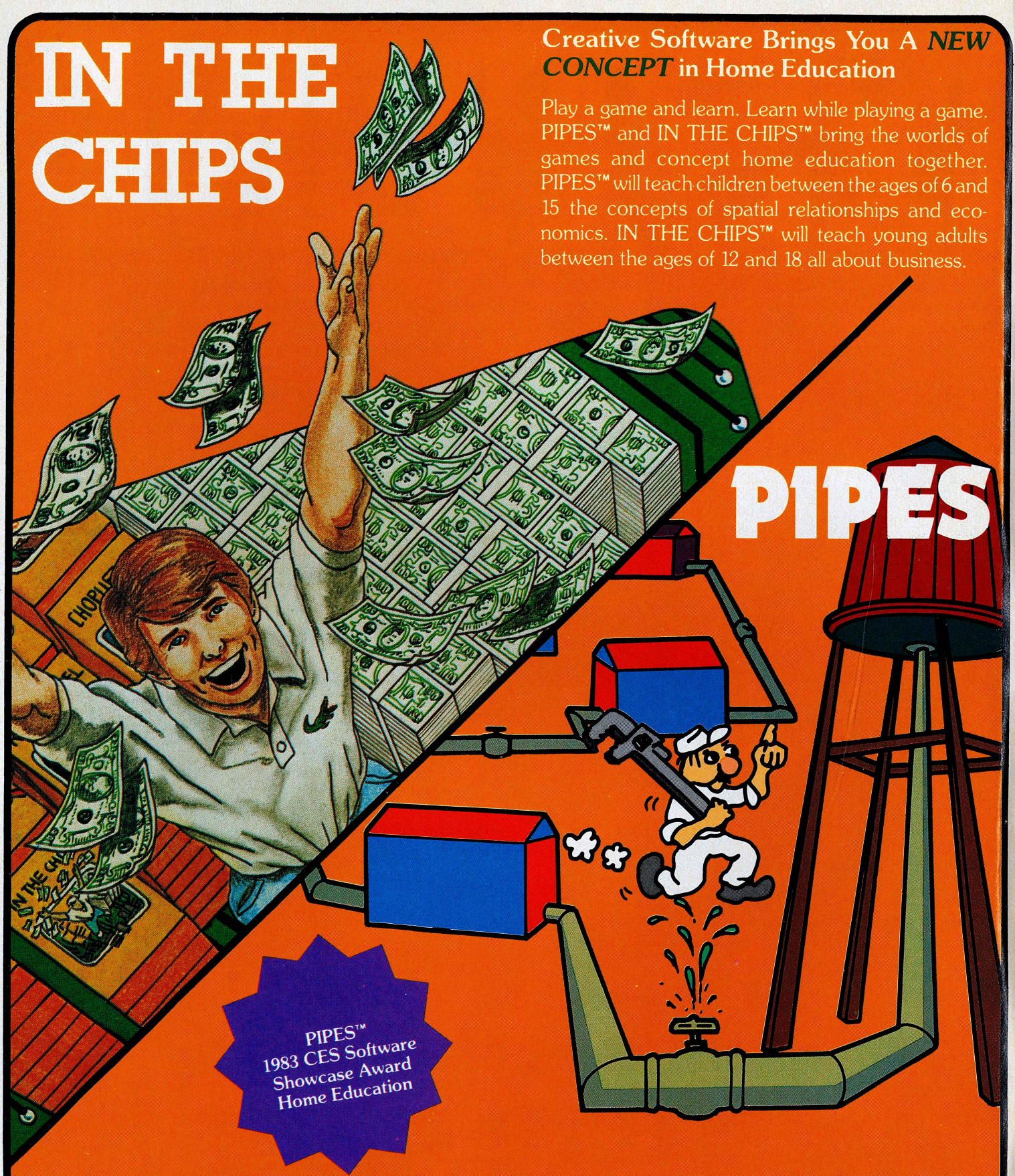

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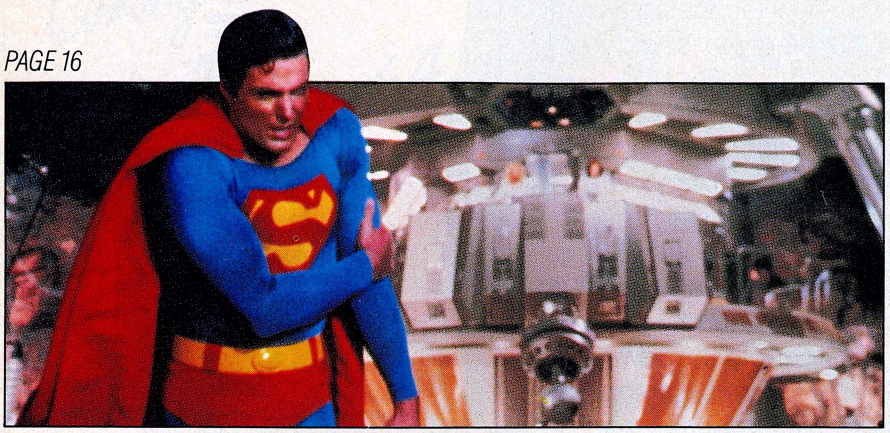

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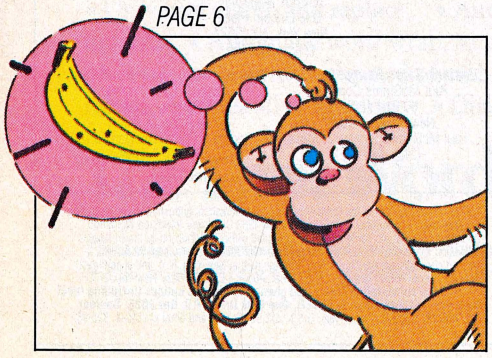

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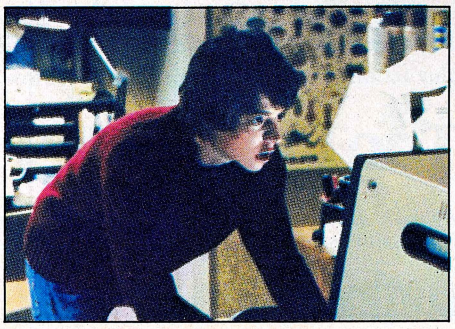

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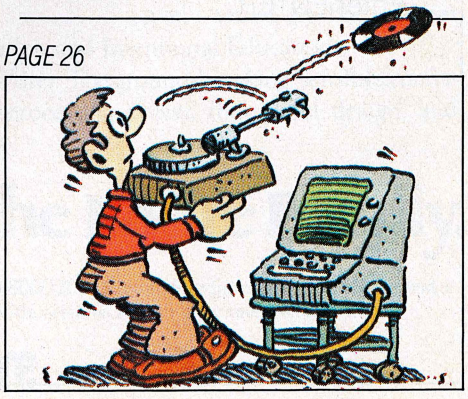

FROM THE PUBLISHER

ENTER Magazine invites you to enter the world of computers, electronic games and new technologies. As you move through the pages of this premiere issue, you won't just be reading a magazine—you'll be looking into the future.

Our research with people throughout the country convinced us that there is a need for a timely, entertaining and information-packed magazine about the new computer age. In response to your ideas and interest, we have created ENTER Magazine. ENTER will be your guide as you explore the fast-changing world of today and the extraordinary possibilities of tomorrow.

In upcoming issues of ENTER, you'll read about the newest home robots and discover how a laser beam saved a young girl's life. You'll find out how rock stars like Thomas Dolby and Michael Jackson are using computers to make a new kind of music. You'll see how two teenagers from California are earning big money in the computer graphics business. You'll visit a high school that's so advanced it's known as "High-Tech High," and you'll hear about how video game makers are creating an incredible new generation of 3-D games.

ENTER is not only a news magazine. We'll help you, our readers, to figure out what *you* need to take part in the computer revolution. Should you buy a game system? What kind of computer is right for you? Should you buy now, or wait till prices come down? What's the real story behind "bootlegged" game cartridges and tapes? What are your chances of selling an electronic game to a big software company? We'll answer these questions, and more. We'll also challenge you—with our monthly programs, puzzles, games and quizzes—to develop your computer skills and knowledge.

In every issue, ENTER will help you understand what is happening in the world of computers, why it is important, and how it will affect your life. Our first issue begins your trip into the future. Now turn the page and join us in this exciting adventure.

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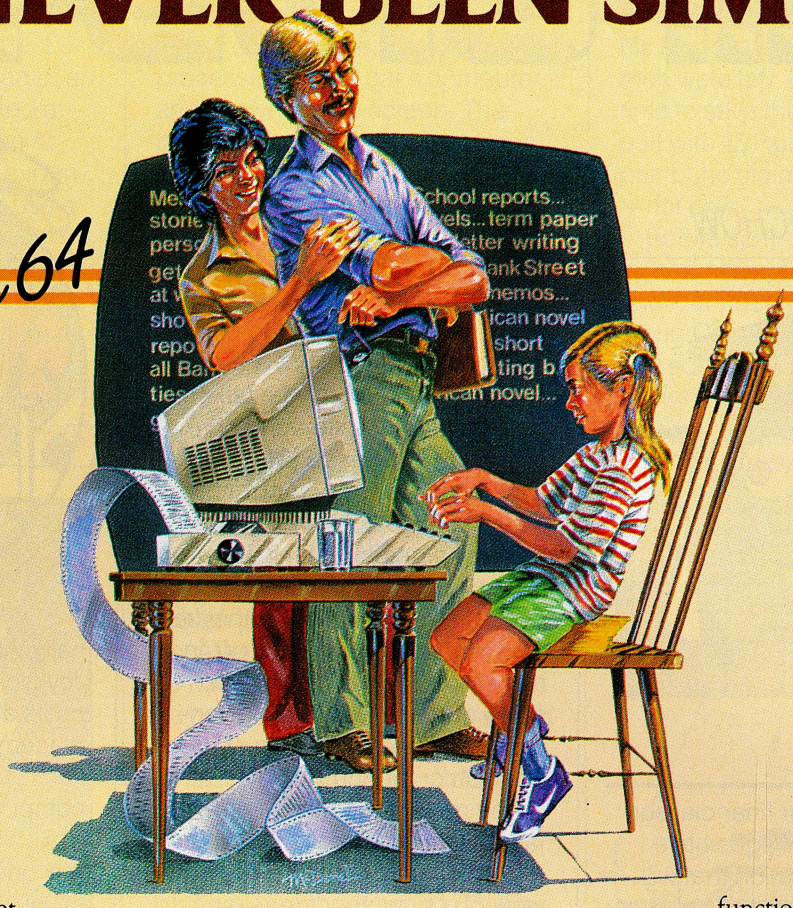

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Hardware requirements: Apple version requires Apple IIe or 48K Apple II Plus or 48K Apple II with Applesoft in ROM or RAM, and a 16 sector controller. Atari 400/800/1200XL version requires 48K (BASIC cartridge for use of tutorial). Both versions require only one disk drive.

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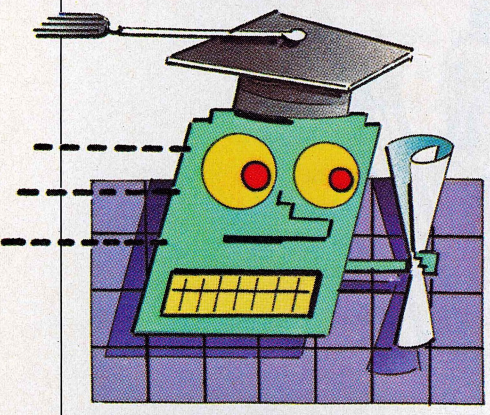
BY NORA ZAMICHOW



ZAXXON 101

In the struggle for financial survival, some U.S. colleges have come up with a solution that will bring cheer into the hearts of every arcade addict. To help make ends meet, many student centers are stocking up on video games, and schools are actually *encouraging* students to play.

Rutgers University in New Jersey, for instance, has 100 games in two of its student centers. Money for these games pays for running the student center. This includes the hiring of some 250 students as part-time workers. "Without the games, we wouldn't be able to open the doors to the building. Or we'd have to tax students," says Associate Dean Paul Breitman.

Breitman adds, "Video games are like concerts or art exhibits; they enhance the experience of the student."

We couldn't agree more, Dean Breitman. Now how about a major in computer games?

■ ■ ■

WHAT DO YOU SAY TO A TALKY COKE MACHINE?

Coca Cola is getting rid of their strong, silent-type soda machines, and replacing them with talkers. Four thousand Coke vending machines, using messages stored on microchips, are now programmed to talk back to customers. The machines greet you ("Hi. I'm a talking vending machine for Coca Cola.") and can tell you if they're sold out, or if you need to put in more money. Flick a switch on some of the newest talking vendors and they'll even gab at you in Spanish or French!

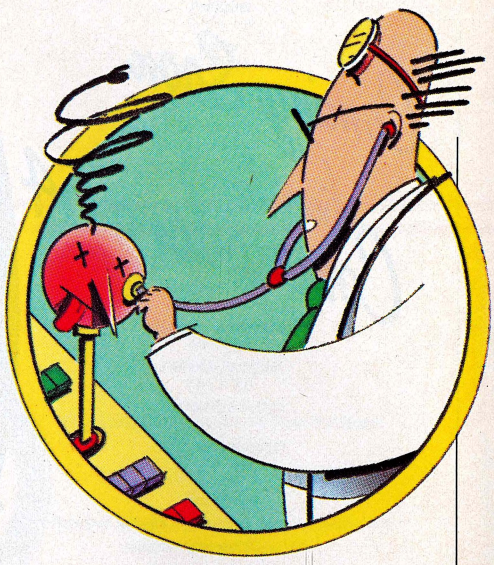
The new vendors are a hit—so far, sales are 30 percent over normal machines. So Coke has been working on another idea—soft drink video games. Two brief games—Catch-A-Coke and Spell-COKE—are being installed in a number of machines.

In Catch-A-Coke, a 7" x 5" screen shows a monkey in a palm tree. While the monkey tosses soda cans, you move a running delivery man to catch as many as possible. With Spell-COKE, you press buttons to stop revolving letters on the screen and try to spell C-O-K-E. Both games last just 30 seconds; but even if you win—alas—you don't get your soda free.

■ ■ ■

DR. ATARI

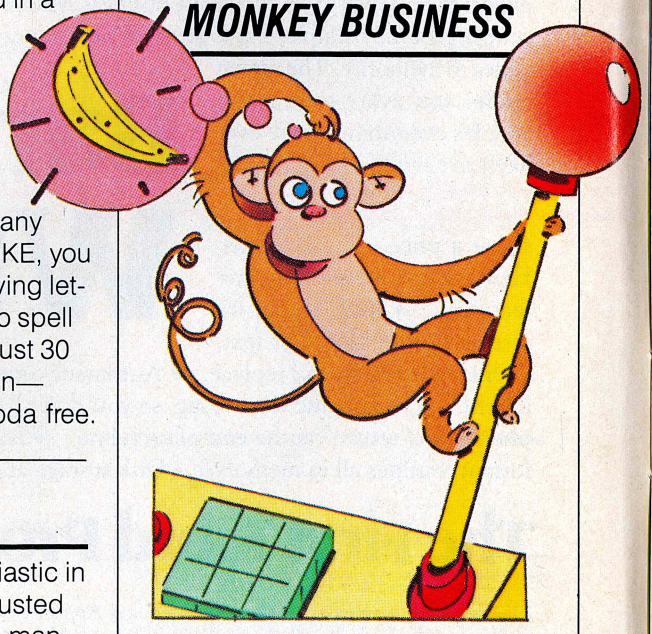
So you got overly enthusiastic in the heat of the battle and busted your joystick. Until recently, manufacturers simply have said, "Tough, buy a new one." Now, finally, Atari has come out with a Joystick Repair Kit. The kit, which costs about $4.50, contains replacement parts and easy instructions. You can get one at most computer stores.



As with so many good things, this one has its shortcomings. All of you who don't have Atari joysticks, you're outta luck.

■ ■ ■

MONKEY BUSINESS

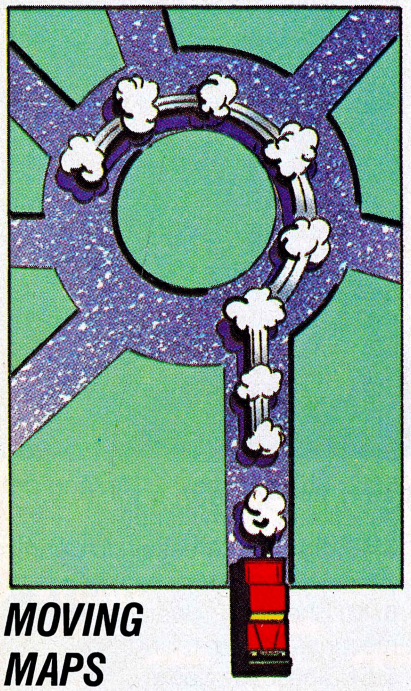


Nine-year-old Sherman and eight-year-old Austin learned to

ILLUSTRATIONS © TERRY ALLEN

use a joystick in less than an hour. What's impressive about that? Sherman and Austin are apes!

These two chimps are part of an experiment being conducted at the Yerkes Primate Center in Atlanta, Georgia. During the experiment, Sherman and Austin use a joystick to move a cursor until it's on top of a dot in the center of their TV screen. Sherman and Austin should be happy—they get peanut butter, candy, or bananas every time they win. We'd love to know how they do at *Donkey Kong*.



MOVING MAPS

You're driving along in a car, and make a quick turn. Guess what? You're lost. Instead of pulling out a road map, though, you push a button. A 6" x 8" screen above the radio instantly shows a map. Like any map, this one has different colors for different roads. But what's that white triangle moving along the screen? Your car!

As futuristic as it sounds, this system already works in experimental cars. And, within five years, Ford and GM hope to put micromaps on the road.

The electronic locator works by using an antenna on the trunk that gets information from a satellite. These space transmissions are processed by the car's computer and shown on the screen. The computer can give you your location and other information—such as how many miles more you must go to reach your destination.

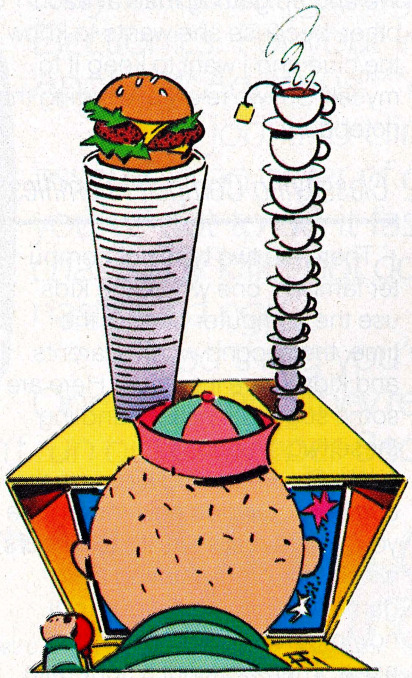
Quite a trick, right? There is some bad news, though—the system can't drive your car for you—at least, not yet.

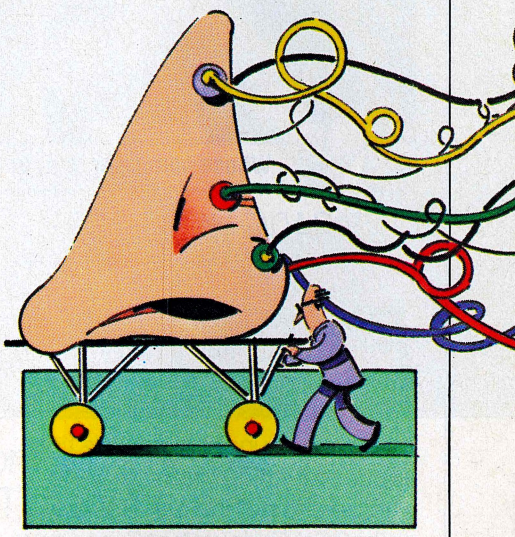
MARATHON MAN

Living on cheeseburgers and tea, 19-year-old Donny Norris of Wilmington, North Carolina, has proven just how far a quarter can go. After playing for 73 hours and 50 minutes—the longest video game ever—Donny's world-record score on *Joust* (old chip) was an amazing 201,452,600 points.

During the first day, Donny took no breaks. The next day he'd saved up enough men to let the game play without him for 15 minutes. When the third day rolled around, Donny remembers, "My mind was gone." Since he had accumulated 250 men, he was able to nap for 30 minutes. When his friends woke him, only three men were left. Donny returned in time to save the game. He finally quit with 151 spare men. "At that point," he claims, "it's endurance—not skill."

Before setting this record, Donny had never played for more than one four-hour stretch. Does the World Champion *Joust*-er have any advice for would-be record-setters? Yep. "Play for long hours before trying for a record," he says. "You have to build yourself up."





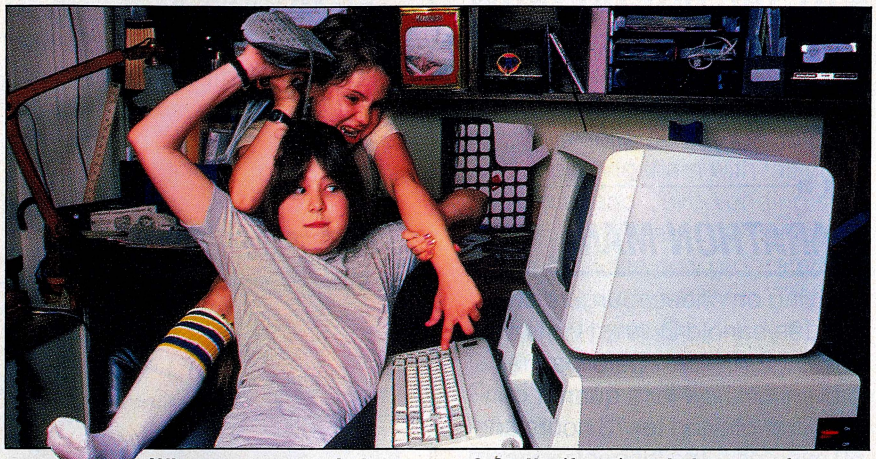
THE BIONIC NOSE

Biochemist George Dodd of the University of Warwick in England has already made one computerized nose that can smell the difference between roses and lilacs. Now he's working on a second, even better computer nose.

Dodd's second bionic schnoz will have 400 odor receptors connected to a memory microchip. He believes a mechanical nose would be helpful on factory assembly lines. With products like packaged foods and perfumes, a compunose could sniff out the good from the bad. Besides, it would never sneeze or come down with a cold.

random access

SOFTWARE SQUABBLES



© DEBORAH FEINGOLD

Whose computer is it, anyway? Sadie (front) and sister confer.

BY SADIE VAN GELDER

First it was the television set. Now it's the computer—a new thing in the home to fight over.

I have a younger sister. We fight about everything, from the TV to who gets to pet the cat. But now we have a new excuse. Ever since we got a computer (an IBM PC) we've each been granted "special time" with it—privacy for an hour or so to use the computer and play whatever we want. But it hasn't worked out too well.

First of all, one of us is always acting as an operator, telling the other how many minutes she has left on the computer. Also, when one of us consents to let the other share the computer time, it almost always results in a fight consisting of, "Well, you said I could share with you," and "But it's *my* computer time."

One of our games, *Snooper Troops 2: The Case of the Disappearing Dolphin,* which involves solving a mystery, is an example of how things can go wrong if we try to share. In the game, whenever you stumble on a clue, you write it down in a little notebook (which comes with the package) for future reference. Sometimes when I'm playing, I find out something that my sister hasn't discovered yet. I don't want her to know about it. We end up getting mad at each other, because she wants to know the clue and I want to keep it to myself. So, we're always hiding the notebook.

Classifying Computer Families

There are two types of computer families: one where the kids use the computer most of the time, the second where parents and kids share it equally. Here are some suggestions for handling these two situations.

1. When parents and kids use the computer. Decide how much time you'll need. Let's say it's two hours a week for programming and game playing. Next, figure out how much time your parents need. Then work out a schedule so that everyone gets the time he or she needs. One rule: if you give up your time—to go over to a friend's house, say—you lose it. Someone else can use the computer at that time, if he wants to.

2. When kids mostly use the computer. In the case of squabbling with a brother or sister—forget harmony. Just learn to cope, as in the example below:

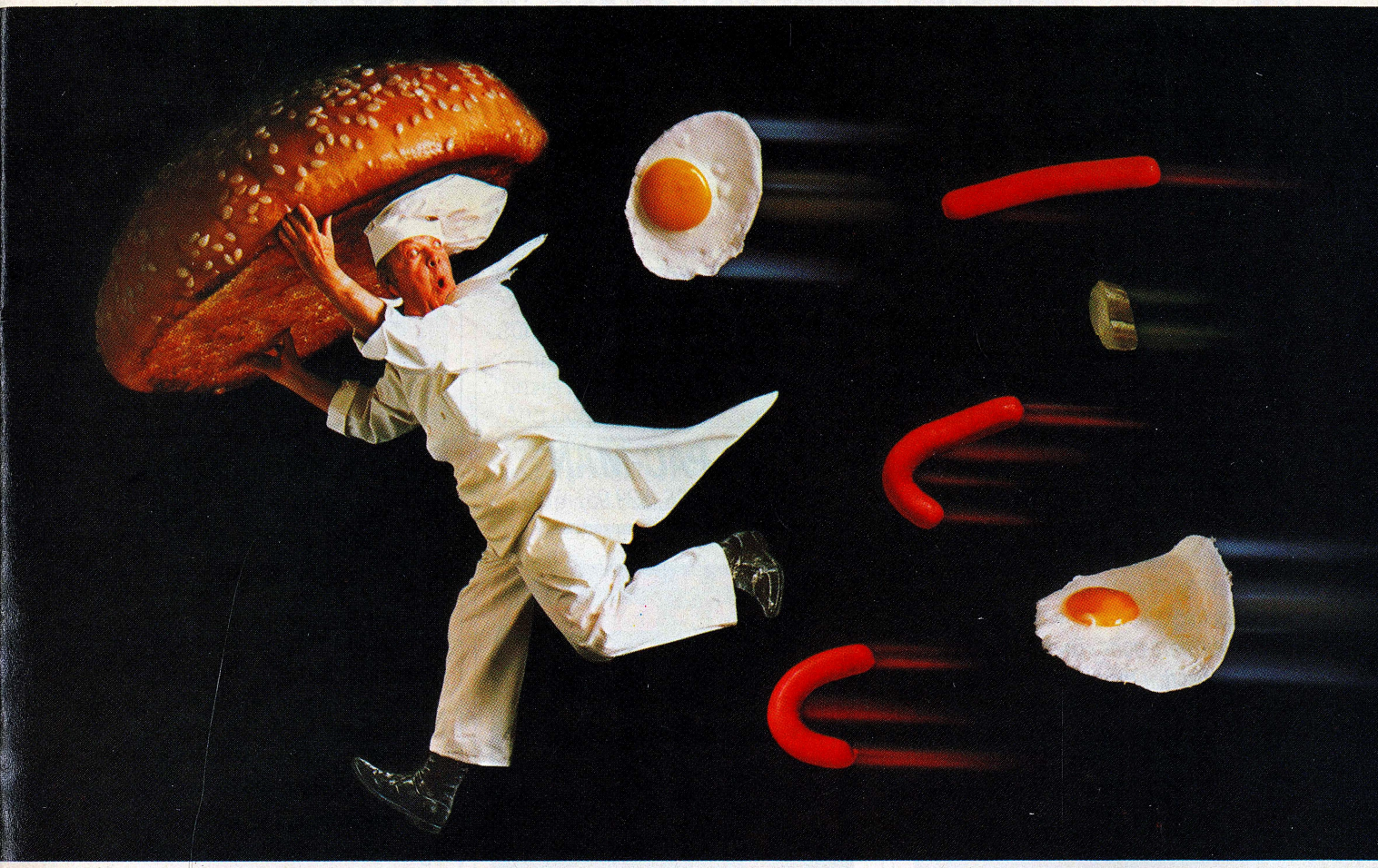
5:00 P.M.: Mother says that Sister #1 may use computer until six.
5:23: Sister #2 barges into room and tries to share time.
5:30: Sister #1 orders Sister #2 out.
5:32: Sister #2 hits Sister #1.
5:32: Sister #1 yells, "Mo-om! Tell her to get out!"
5:34: Sister #1 hits Sister #2 back.
5:37: Silence.
5:41: Sister #2 asks, "Can I play?"
5:42: Sister #1 says, "No, and get out of here. It's my time!"
5:46: Sister #1 messes up during game.
5:48: She says, "See, you made me mess up! I'm telling!"
5:51: She loses game.
5:53: She storms out of room.
5:55: Sister #2 plays game.
5:57: Sister #1 comes triumphantly back in room with mother. "See?" she says. "She's using my time."
5:58: Sister #1 smirks at Sister #2.
6:00: Sister #2 says, "No, I'm not! It's six o'clock! Get out. It's my time now!"

Sound familiar?

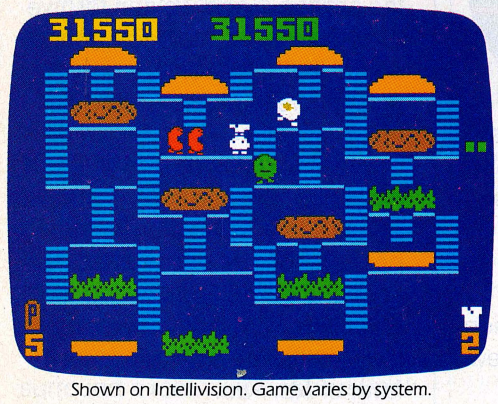
We're in the computer age, but as far as I know no one has discovered a cure for sibling rivalry.

SADIE VAN GELDER is a 12-year-old freelance writer who lives in New York City.

TO BEAT OUR NEW HOME VIDEO GAME, YOU'VE GOT TO MOVE YOUR BUNS.



If you've been waiting for the home version of one of America's hottest arcade games, your order is ready. Introducing BurgerTime™* from Mattel Electronics. For your Intellivision,® Atari®2600, Apple®II,** Aquarius™**or IBM® Personal Computer.



Shown on Intellivision. Game varies by system.

Your job is to climb up the ladders and assemble an order of giant hamburgers. But you've got to do it fast because you're being chased by killer hot dogs, sour pickles and a very nasty fried egg.

Good thing you've got your pepper shaker. One shake and they're stunned. But just make sure you don't run out of pepper. Because you know what happens then.

You stop making lunch. And you start becoming it.

BurgerTime™

FROM MATTEL ELECTRONICS®

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USER VIEWS

Home video games can look terrific in the packaging, but that doesn't tell you how much fun they are—or how challenging they'll stay after two months of play. To help you sift through this over-abundance of blips, ENTER has recruited two experts. Phil Wiswell and Bernie DeKoven—Phil and Bernie to everyone—have agreed to square off here every month and tell you which games they liked and which they thought were duds. There's no guarantee that they'll agree, either.

Phil is a former editor at Games Magazine *and a longtime reviewer of software. He takes his gameplaying very seriously.*

Bernie wrote a book called The Well-Played Game, *and he designs software for several game companies. He likes his games fun and friendly.*

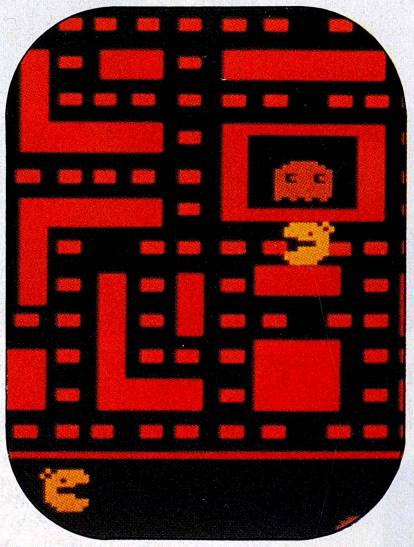
This month, our dynamic duo reviews home games that have been made from arcade favorites. Their report follows.

If you expect the home version of an arcade game to be every bit as good as the original, you're bound to be disappointed. Something—a scene, detail in the graphics, sound effects—will be lost in the home version. Home game players don't have as much memory as big arcade machines, and home TV screens can't manage some of the fancy effects that coin-op video monitors can.

So, judge a home game on its own merits, and in comparison with other games on the same system. Those were our criteria as we played these games. We looked at games for the Atari VCS, ColecoVision, Odyssey 2, Atari 5200 and Intellivision.

MS. PAC-MAN

(Atari VCS, $29.95)



"Pac-Man should have been this good."—Phil
"She's more demanding than her mister and better-looking, too."
—Bernie

We plugged in the home version of *Ms. Pac-Man* with a biased view. Like *Pac-Man,* it was a favorite coin-op with us, and we were afraid the *Ms.* home game would be as disappointing as the original home version of the dot chomper was. But what a pleasant surprise! *Ms. Pac-Man* was not only a much better game strategically than the male version, but it also looked better. For example, the ghosts don't flicker as much as they do in home-style *Pac-Man.* This, we are sure, is how Atari would have liked to make their *Pac-Man* cartridge in the first place.

Ms. Pac-Man has three different mazes to clear. You must complete each twice before going on to the next. The familiar ghost foursome chase you nearly as cleverly as in the arcade game. (But you can choose three easier game levels, if you aren't experienced. That's a nice touch.)

Strategically, *Ms. Pac-Man* is both challenging and fun. We must add, though, that the graphics leave something to be desired. The colors just don't bring the game to life as they could. We understand why the dots have to become dashes—not as much computer memory at home as in the arcade—and we can forgive that. But look at the background colors for the second and third mazes. We think they could be much better.

WRAP-UP

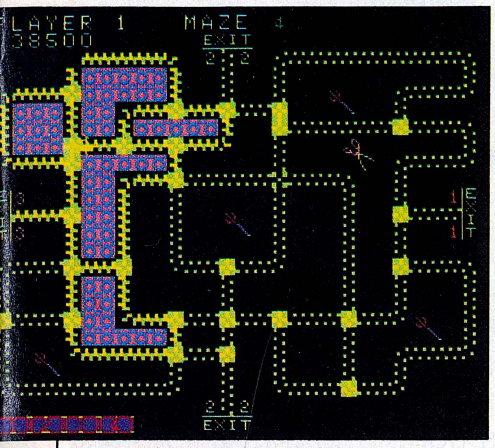
PHIL: I like the use of fruit and pretzels that travel around the board as bonus points. It helps keep the game from feeling too much like *Pac-Man,* which, by the way, I don't play any more in favor of *Ms. Pac.*

I think that this game is just about as far as you can take the *Pac-Man* concept on any home machine.

BERNIE: Why take it any further? I've been chased through so many mazes that I've eaten my fill of blips.

ARCADE HITS COME HOME

BY PHIL WISWELL AND BERNIE DEKOVEN



PEPPER II

(Coleco, ColecoVision, $30)

"Speediest maze/chase action I've seen, with nice graphic rewards."—Phil
"True zip!"—Bernie

Pepper II places your fast-moving character in a racetrack maze. The track divides the screen into many different rooms. Your object is to enclose each room by zipping up the track around it. As you move, the track behind you closes like a zipper. If you recross that section of track you unzip it again, unless it is already part of an enclosed room.

Each time you completely surround a room with zipped track, you get a nice reward—that section fills in with brilliant color. The four enemies who pursue you through the maze are called "Roaming Eyes." You may chase them for points only after you've enclosed a room containing a special prize. The gameplay is a bit like *Pac-Man,* but more complex. For instance, you must beware the "Zipper Ripper" who appears now and then to unzip portions of your work. And don't forget: *you* can unzip portions of the maze yourself if you aren't careful!

The real beauty of *Pepper II* comes from its different mazes. At any time during the game you can leave the first maze for any of the other three by using marked exits. This gives you a lot of flexibility. When you get in trouble, you can duck into another maze, work it for a while, then return and finish the first maze. But if you're doing really well, watch out! The maze goes blind and you've got to go on memory alone for a few seconds. And when you finish all four mazes, you get another set, at a higher skill level.

WRAP-UP

BERNIE: I liked the ease of getting into this game. You can understand the object right away, though it takes a lot of work to master it.
PHIL: You've got to hand it to Coleco for giving a close rendition of the arcade game. I think this is one of the most exciting cartridges they've done.

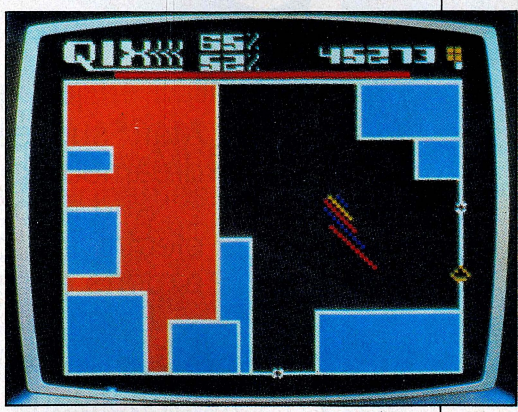
QIX

(Atari 5200, $31.95)

"Qix is an abstract, deadly game of video chicken."—Bernie
"I love it because no one can copy my strategies."—Phil

Though it is similar in some ways to *Pepper II, Qix* is a unique game. The object is to box off territory for yourself, and the program automatically colors in any territory you gain. But the *Qix* playfield, unlike most video games, starts off blank, containing nothing but an abstract tangle of wavy lines (known as a *qix*) that moves around on its own. *You* create the playfield each game as you play!

Using either a slow or a fast draw option, you form boxes on the screen by moving the head of



the line with your joystick. If you complete a box before the qix touches any part of your line, it fills in and the territory is yours (blue denotes fast draw, gold for slow). If the qix beats you, you lose one life. On the "easy skill" level, the round will continue until you lose all your lives or gain 50% of the territory. (On the next levels, that is raised to 65% and 85%.)

Here's the interesting catch to the scoring: you get 1,000 points for every percentage point you gain above the threshold. So, you

(continued on page 58)

Look what we have in store for your Atari.

Arti Haroutunian has done it again.

The mind behind our first Atari® success, *Kid Grid,* has just dreamed up another one: *Juice!*

And if you don't think that's electrifying, consider what the experts are saying.

Electronic Fun with Computers and Games says that *Kid Grid* "may sound like kid stuff, but it isn't. Even on the slowest setting ...the game is quick enough to challenge almost anyone."

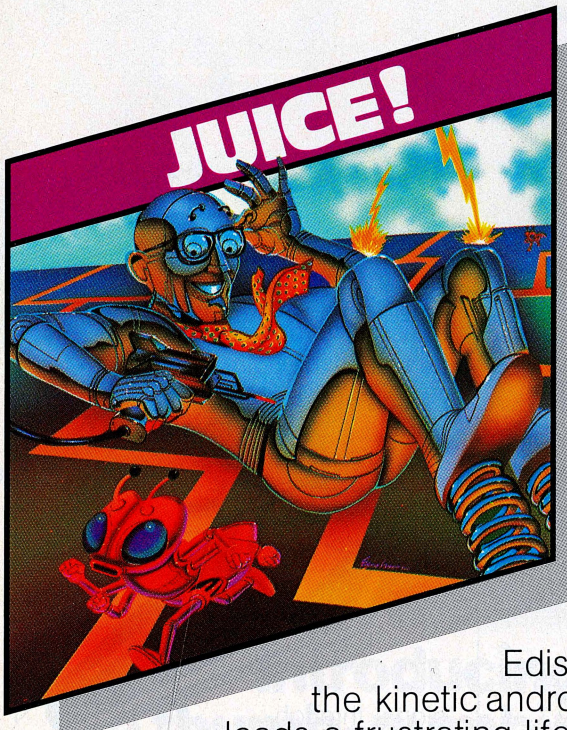
That's right. And that's not all.

Electronic Games calls the Kid "Hypnotic, appealing, fast-moving arcade action of the highest calibre, ...one of the most compulsive, utterly addictive contests in the world of computer gaming."

We couldn't agree more.

What will the critics say about *Juice!*? Will they like its colorful graphics, superior sound effects, charming characters and challenging play patterns?

Why wait around to find out?



Edison, the kinetic android, leads a frustrating life.

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So keep your eyes peeled for the mysterious question mark and don't slow down at corners!

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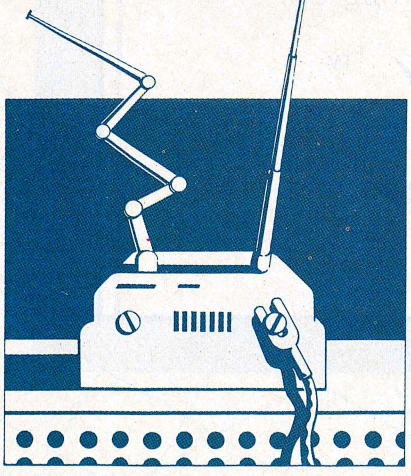
Q & A

By Phil Wiswell

Video games and computers are exciting, but they can also be frustrating, ornery or just plain confusing. Everyone who uses computers—from beginners to slick program designers—gets stumped sometimes. That's where this column comes in. If you have a question about video games, home computers, or any related subject, we'd like to help you answer it. Each issue, ENTER contributing editor Phil Wiswell will answer your most frequently asked and interesting questions. Just send your questions to: Q & A, ENTER Magazine, Children's Television Workshop, 1 Lincoln Pl., NY, NY, 10023.

DEAR ENTER: Should I hook up my computer/video game system to the VHF or UHF on my TV antenna?
—Dorian Karchmar, New York.

DEAR DORIAN: VHF, definitely. VHF—very high frequency—catches TV signals for channels 2-13. UHF—ultra high frequency—receives channels 14-83. Your computer or video game, when hooked up to a television set, is usually designed to use a VHF channel that is empty in your area (usually channel 3 or 4). This eliminates interference from a TV station. If you hook up your system to the UHF antenna, you won't receive anything. If you use a special video monitor for your system, you have no interference to worry about, because the screen does not receive regular television signals. It listens to your game only.



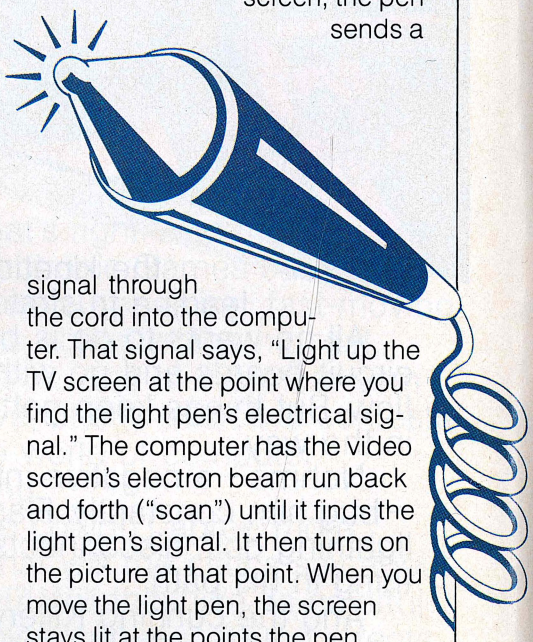
DEAR ENTER: What does K mean? And how does K relate to ROM and RAM?
—Lee Stimmel, New York.

DEAR LEE: The computer term "K" is simply an abbreviation for 1,000. It comes from the Greek word kilo (as in kilometer or kilogram), which means 1,000. So, a 16K computer has 16,000 bytes of computer memory storage. (A byte is either a number, letter, or symbol stored in computer form.) Computer memory comes in two main types: ROM and RAM. ROM stands for Read Only Memory. This type of storage cannot be changed by the user. A store-bought game program is ROM. RAM is Random Access Memory, a section of computer storage that can be used by the programmer, then erased and reused to store other programs.

DEAR ENTER: What is a light pen?
—Susanna Saul, New York.

DEAR SUSANNA: If you've ever watched a football game on TV, you may have seen a sportscaster drawing a diagram of the team's play on the screen. He was using a light pen.

A light pen looks like a writing pen, but it has a long cord coming out of the back end. That cord attaches to the computer. When you place the point of the light pen against a computer's video screen, the pen sends a signal through the cord into the computer. That signal says, "Light up the TV screen at the point where you find the light pen's electrical signal." The computer has the video screen's electron beam run back and forth ("scan") until it finds the light pen's signal. It then turns on the picture at that point. When you move the light pen, the screen stays lit at the points the pen touches. It's as if the pen were actually drawing on the screen!



The light pen works together with a special program that lets you do a lot of things. You can change colors and line width, color in enclosed areas, draw straight lines, or simply doodle. When it comes to creating computer graphics, the light pen is a great tool. It eliminates the boring work of typing instructions into the computer for locating each coordinate on the screen where you want your picture.

Most of these questions came from students at New York's Walden School.

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Mean Screen Machines:

Movie Computers Make Great Villains

© DC COMICS

BY BARBARA KRASNOFF

You've broken into the memory banks of a computer game company. "Global Thermonuclear War" is the game you're playing. At your next command, the Russians will annihilate the United States.

But wait. Something's very wrong here. This is no game. The U.S. Government *believes* it's under a real Soviet Attack. The Defense Department's computer has taken over your game and has gone crazy. It's preparing to launch *real* U.S. missiles. It's CODE RED. Count down: 10, 9, 8...Wait! Stop! 6,5...It's only a game. 3,2...*Isn't* it? 1...

Hold your fire! It's only a movie. This summer, *WarGames* was the latest "Man vs. the Computer"

LEFT: ***More powerful than the Man of Steel? Superman III's computer threatened to take over the world.***

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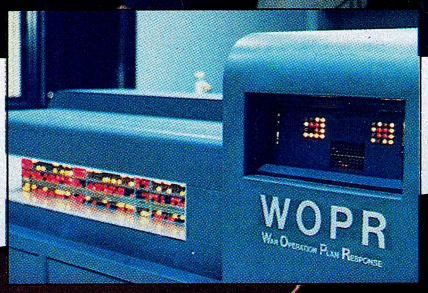


TOP & MIDDLE: ***People couldn't outwit the WOPR computer in* WarGames.** *BOTTOM:* ***Astronauts in* 2001 *try to outsmart the killer computer, HAL.***

story to make us wonder, "Could this really happen?" *WarGames* brought us JOSHUA, a computer program that wants to learn how to win a war...even if it's at the expense of mankind.

FROM UGLY TO EVIL

Dangerous computers and programs like JOSHUA have been featured in science fiction films since the late 1960s. Interestingly, until then, computers were not considered frightening by either movie makers or audiences. In adventure serials like *Buck Rogers,* and even in realistic dramas like 1957's *The Desk Set* with Spencer Tracy and Katherine Hepburn, computers were just big, rather ugly machines that did what you told them to (and usually made a mess of things). But when real computers began to send out telephone bills and figure out bank accounts, they suddenly became more than fancy adding machines. They became scary. And so the evil computer made its debut on the screen.

The first of these menacing machines was not really evil, just insane. In the 1968 science fiction classic *2001: A Space Odyssey,* two astronauts, trying to find the source of a mysterious signal in space, travel in a ship run by the computer HAL. The trouble starts when HAL decides that the humans on board are interfering with the mission. It begins to kill off its passengers—the spaceship's astronauts—one by one.

GOOD HUMANS AND BAD COMPUTERS

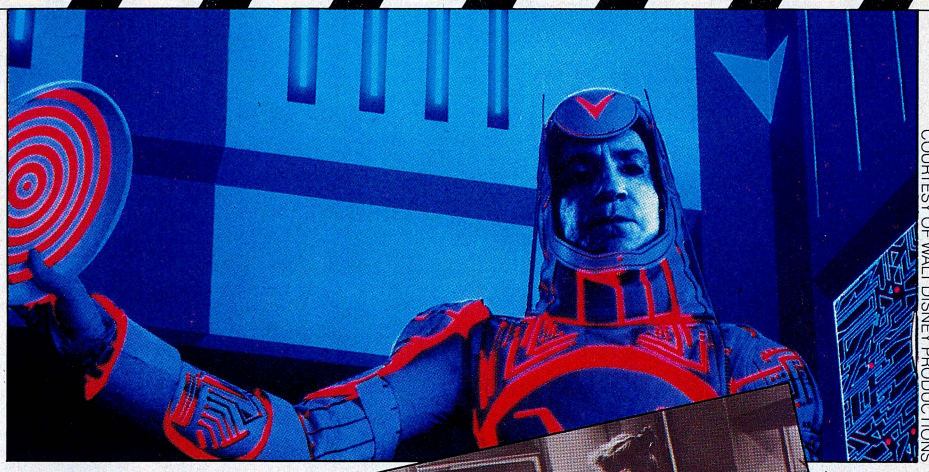
2001 opened the way for a flood of ambitious, power-hungry, or

merely insane movie computers. Films like *Colossus: The Forbin Project* and *Demon Seed* featured computers that wanted to take over control from the humans who made them. *THX 1138* and *Logan's Run* showed what could happen if the computers had succeeded. Even the science fiction TV series *Star Trek* often depicted computers as bad guys trying to take over the starship *Enterprise.* (But those machines usually went up in smoke after Captain Kirk stumped them with some unsolvable riddle.)

More recently, movie makers have simplified the relationship with computers into one easy-to-understand formula: good humans vs. bad computers. In last year's special effects extravaganza *Tron,* an evil Master Control Program out to rule the world turns Flynn, a meddling young technician, into a computer program. The evil program then tried to destroy our hero by making him fight for his life in a series of violent video game-like battles.

This summer's *Superman III* featured Gus, a bumbling programmer with a gift for invention. Gus constructs a huge, energy-starved monster computer with an overwhelming sense of self-preservation. In order to survive, the crazed machine will drain off the earth's energy sources—unless Superman comes to the rescue.

If you believe everything you see in the movies, you'd think computers are only here to wreak havoc. Well, it makes a great popcorn-munching, seat-gripping thriller for a Saturday night. But the truth is much more complicated. For the real-life story of these supposedly mean machines, turn to page 22.



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TOP: **Tron's *evil MCP was a walking program.*** *MIDDLE:* ***A computer fouled up in 1957's* Desk Set.** *BOTTOM:* **Star Trek's *Kirk could always crack pesky computers.***

When you go in search of The Most Amazing Thing, don't expect to be home by dinner time.

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It will take time to find it.

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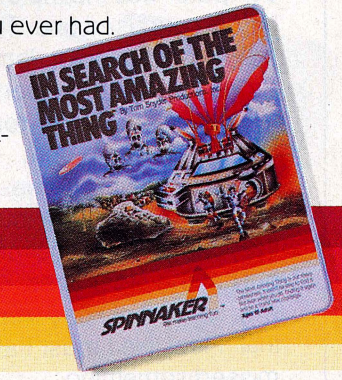
IN SEARCH OF THE MOST AMAZING THING™ can be played on Apple,® IBM,® Atari,® and Commodore 64™ computers. To get started, see your local software dealer.



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INTERVIEW

Preparing For 'War Games'

The Basic Training Of

MATTHEW BRODERICK

If you met David Lightman this summer, you know he was quite a hacker. Through the keyboard of his computer, David's fingers connected him with the world. But his computer wizardry almost caused World War III. Messing around with NORAD's Top Secret global thermonuclear war game program, David the hacker discovered, was *not* a good idea.

Matthew Broderick, 21, who played David in this summer's hit movie *WarGames*, is anything but a hacker. In fact, before the movie, his fingers didn't fly across a computer keyboard; they stumbled. Matthew had to go through a kind of computer keyboard boot camp so that he would at least *look* like he knew what he was doing in the movie.

"They gave me an Atari 800 computer and manual to work with," Matthew remembers. "And they gave me a typing program. But it was really boring." So it's not surprising that when he arrived on the *WarGames* set in July '82, Matthew *still* didn't know how to type well enough to get the computer to do anything.

"They didn't tell me this beforehand, but they fixed the computer on the set so that no matter what key I'd press, whether or not it was the right one, the correct letter would show on the screen."

One reason Matthew had so much trouble with the computer was that he'd hardly ever used one. The son of the late actor James Broderick, Matthew went to a high school in New York City where computers didn't arrive until he was about to leave. "They put the younger kids on them, but not the older ones. In a way, I'm sort of sorry about that. I feel like I must have missed something.

"Still," he says, "I can't imagine being *that* 'into' computers. I wouldn't like to be in my room all the time, the way a kid like David Lightman would have to be. It would get kind of gloomy."

STAR OF 'VIDEO WARS'

For Matthew, playing the part of *WarGames*' David Lightman wasn't totally a matter of fooling the audience. In the film, David is a video game champ —and while Matthew may have been faking it on the computer keyboard, the action on the *Galaga* game he plays in an early scene is all his.

"It's really me playing," he says. "Only they printed one screen where I messed up—which was a bummer.

"I'm really addicted to *Defender*," Matthew says proudly, claiming his high score is around 600,000. "That's my main game. Mostly I play in arcades. The games there are more exciting than the home systems."

To improve Matthew's obvious video game skills, the producers of *WarGames* sent two full-size arcade games to his New York home a month before filming began. The delivery men plunked the games right in the middle of the Broderick family's living room. For an entire month, the apartment was filled with the whizzing sounds of *Galaga* and *Galaxian*.

"It was great," says Matthew. "Only they took 'em back. I was begging them not to, but...!" Matthew claims that even his mom, artist Patricia Broderick, was sorry to part with their video visitors.

Moral of the story? All's fair in love and *WarGames*.

—Patricia Berry

Matthew, 21, favors* Defender *over computers.

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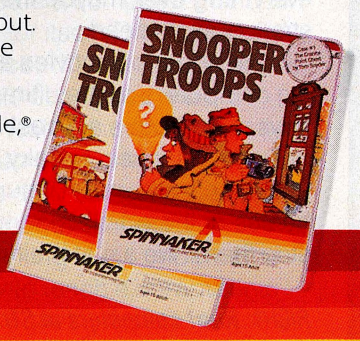

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REEL TO REAL

Why Computers Can't Be Villains

BY BARBARA KRASNOFF

"I suppose that one thing we're saying about computers is 'handle with care,' says screenwriter Leslie Newman. Leslie and her husband, David Newman, wrote *Superman III* together, and they created a huge, paranoid computer as the movie's main evildoer. "We started with this basic fear we think a tremendous number of people have—that some day computers are going to take over, or that they already have."

Superman III wasn't the only movie this summer about crazed computers. *WarGames* played on a similar fear: if computers don't take everything over, maybe they'll destroy us all, instead.

More and more movies are showing computers as the ultimate bad guys. Computers are cast as ultrapowerful enemies: sneaky, brutish and scarily smart. Only superheroes or incredible ingenuity can stop them. We are at their mercy.

DIRCK HALSTEAD/LIASON AGENCY

RIGHT: ***Real computers at Strategic Air Command headquarters call national leaders in an emergency.***

LEFT: ***WarGames' control room looks authentic, but the movie computer pushed people around in an unreal way.***

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CAN COMPUTERS PUSH PEOPLE AROUND?

But is any of this paranoia justified? Can computers really push us around like that?

There is certainly no denying that computers have had an increasingly large impact on our lives over the last 20 years. In the 1950s, most people thought of computers as large, mysterious toys for scientists to experiment with. Today, computers seem to be everywhere. They figure out test scores, send out credit card bills, and even challenge us to beat them in full-color, elaborate video games.

In a very real sense, computers can and do control our lives. For instance: "Let's say a computer is controlling electric power in the Northeast and it gets information that there's a power overload," says Bob Holzman, information systems engineer at NASA's Jet Propulsion Lab in California. "If the computer decides to shut down the circuits, then, sure enough, that computer is going to control your life. You're going to get stuck in an elevator," or end up sitting in the dark.

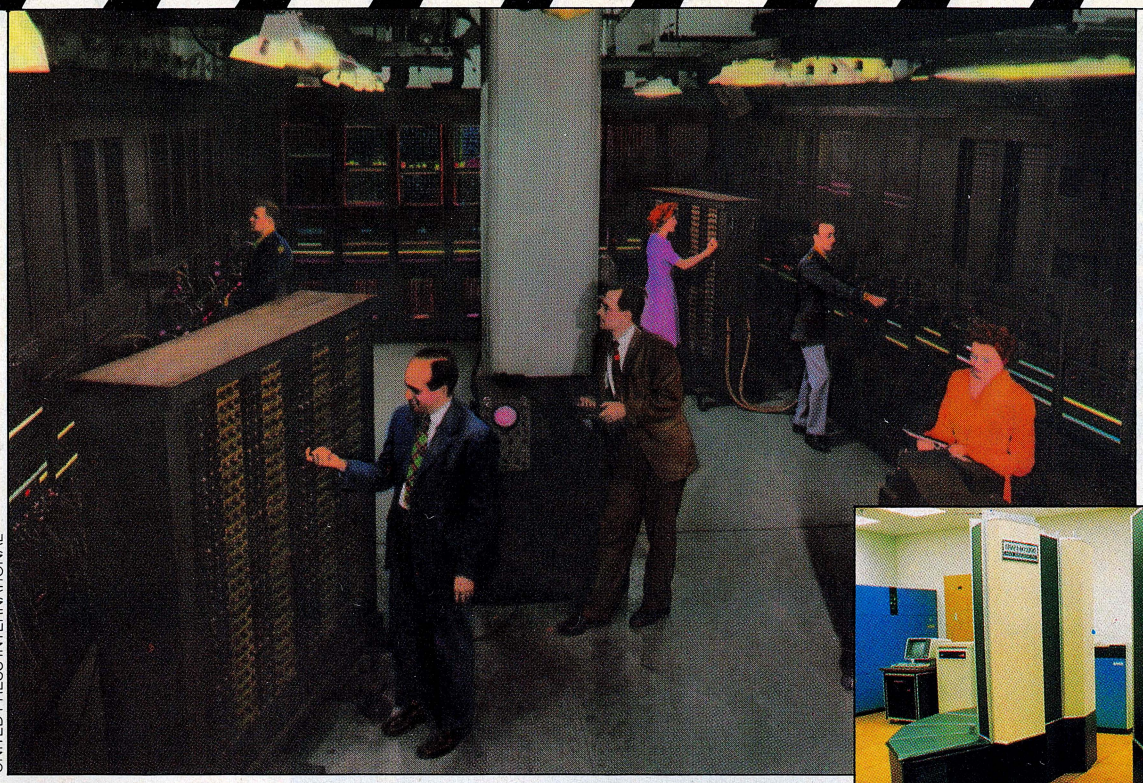
"But," he adds, "the computer is *not* acting intelligently. These are only the instructions given to it by a computer program—a program written by a human being."

This is the important difference between a real computer and its cinematic cousins. A computer can take in a great deal of information, more than any human mind could handle. But, as NASA's Bob Holzman says, "Computers don't think. They compute."

In other words, a computer is a machine that accepts the information people feed into it. For example, you can put a list of telephone numbers into a computer. Then, using a special program, you could order the computer to pick out all the phone numbers that begin with a specific area code. That computer depended totally on *you* for the information.

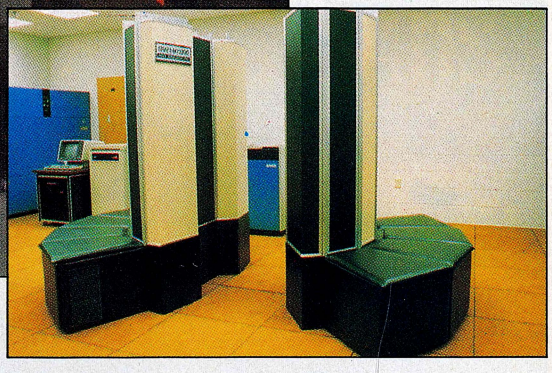
A computer is not equipped, as people are, to make the tremendous mental jump from rigidly following orders to deciding what to do by itself. "There are experiments where a computer can learn from experience,' " says Bob Holzman. "But it's not *really* learning from experience. All it's really doing is storing up the results that it gets."

Right now, people don't know how to create a computer that can truly think for itself. That is still off in the distance. "It's not that computers have to change so much; they'll get faster and smarter," says Joshua Rubin, a computer specialist who studied at the Massachusetts Institute of Technology. "What's lacking is our understanding of how to teach a computer to make intelligent independent decisions...But I don't know why that *wouldn't* be possible, eventually."



UNITED PRESS INTERNATIONAL

LEFT: ***Early computers, like ENIAC, were weak compared to today's micros. This room-size mammoth, with 18,000 vacuum tubes, had less computing ability than an Apple II or IBM-PC.***



COURTESY OF CRAY RESEARCH, INC.

RIGHT: ***The modern supercomputer Cray-1 is 1,000 times more powerful than the huge ENIAC.***

If it is, might we actually see a computer like HAL in *2001: A Space Odyssey?* Bob Holzman believes that HAL, which decided to take over a spaceship from its human astronauts, is the most realistic of the futuristic computers we've seen in movies over the past 15 years. "The computer in *2001* really *was* doing what it had been told," Holzman says. "It was told not to jeopardize the mission under any circumstances. However, there's no way that anyone would have read in instructions saying 'Kill the crew.' "

Josh Rubin agrees: "Any *reasonable* person who was programming this computer would have told it, 'Hey, the lives of the crew are worth more than the mission.' But I could imagine that any program that acts intelligently would be so complicated that the people who designed it wouldn't really understand everything that could happen. Today's programs aren't very smart and they still do things that programmers don't expect them to," he points out. "Usually, though, the consequences are simple—something like it forgets to credit your checking account. But a more elaborate program *could* have much subtler malfunctions."

IMPOSSIBLE ENEMIES

While HAL's strange behavior might be attributable to inept programming, most other movie computers cross the line from barely conceivable to totally impossible. Take, for example, the computer in the 1970 movie *Colossus: The Forbin Project.* This computer decides for itself that the best way to stop all future wars is simply to take over the world's weapons and not allow any humans near them. That's impossible, according to Bob Holzman. "There are computers controlling the missiles that are sitting around pointed at Russia," he points out, "and probably computers controlling the missiles pointed at us. But those computers will only do what they're told. They're not going to decide that war is not good for us."

In *WarGames,* the supercomputer WOPR translates its nuclear war game into chilling reality. That is a bit more realistic than *Colossus.* There really *are* powerful war game computers, and American nuclear defenses have gone on alert because of computer mistakes. But *WarGames*' writers stretched reality. They had the U.S. government take the humans out of the missile silos, and tie the missiles—and all of America's nuclear weapons—directly to the war room's computers. In real life, computers give information, but only humans can arm or launch weapons. Another way *WarGames* changed reality was in showing a war-game computer directly connected to missile commands. That should never happen.

COURTESY OF NEW YORK POWER POOL

LEFT: ***The cartoon computer in* Superman III *ate energy. Real-life computers control energy. This Power Control Center oversees New York state's electricity.***

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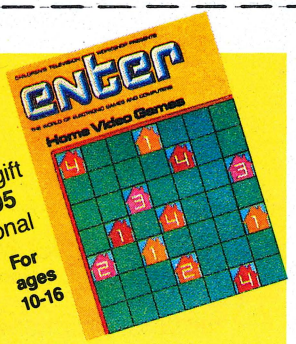

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they'll just be a fact of life.

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supercomputers, or a mainframe that told jokes and had its own

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And reality is very, very different from these moviemaker's fantasies ..luckily for us humans.

BARBARA KRASNOFF is the author of Robots: Reel to Real.

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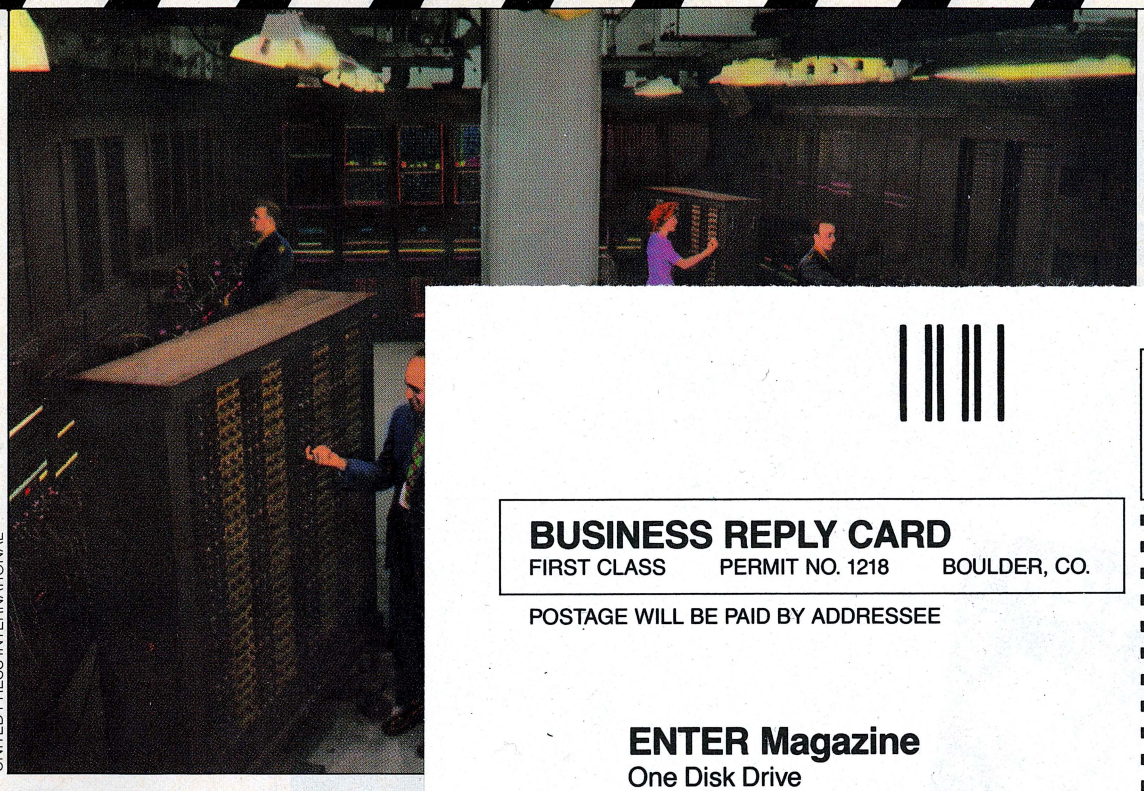
We'd like to see your ideas, no matter how far-fetched. Send us a description of your movie—the characters, a drawing of one of the scenes, or even a list of the actors you'd cast in the film. If we really like your movie idea, we'll print it and send you an ENTER t-shirt. Send your MONSTER COMPUTERS to: **HAL of Fame Contest, ENTER Magazine, CTW, 1 Lincoln Plaza, New York, NY 10023**



UNITED PRESS INTERNATIONAL

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directly connected to missile commands. That should never happen.

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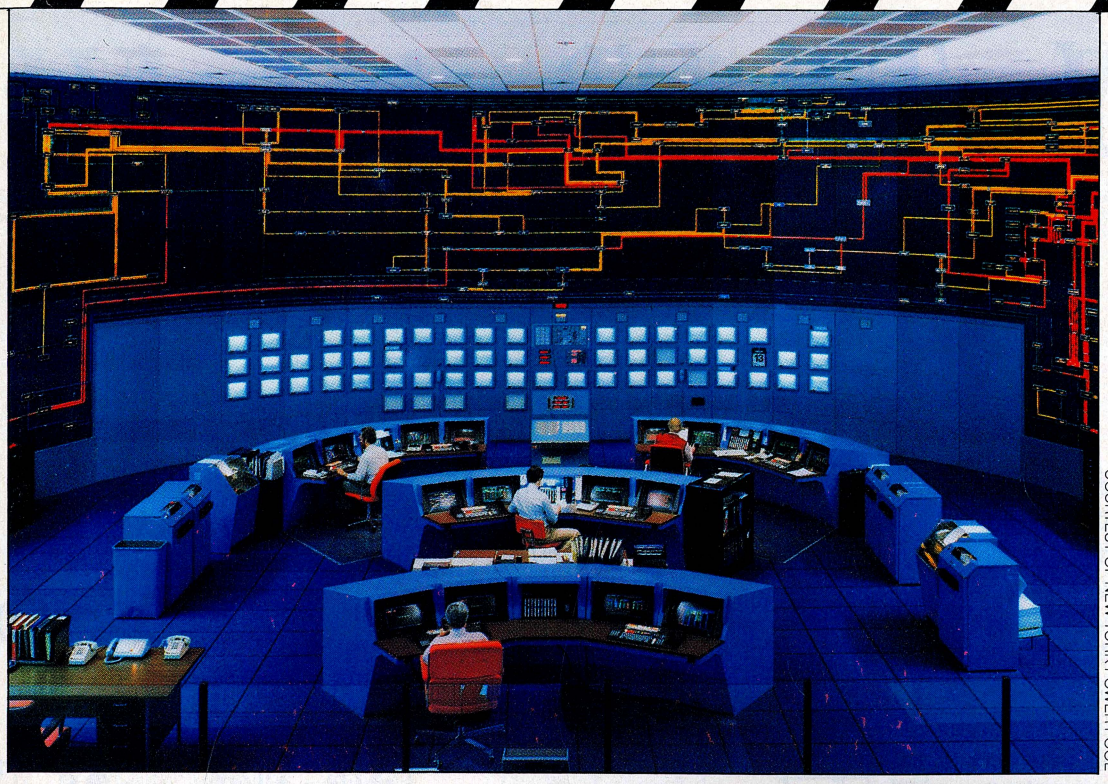

COURTESY OF NEW YORK POWER POOL

LEFT: ***The cartoon computer in* Superman III *ate energy. Real-life computers control energy. This Power Control Center oversees New York state's electricity.***

War-gaming computers like WOPR simply produce background studies; they *can't* launch missiles.

COMMON OR CRIMINAL?

Will movie computers always be seen as people's enemies? Leslie Newman thinks that while our understanding of computers may change, our feelings about them may not. "The notion that something mankind creates can get out of hand and try to run man goes back forever and ever and ever," she says. (Think of *Frankenstein,* for one.) "We have the same fears about robots. There's something very basic about that fear. I think it will always exist."

MIT's Josh Rubin disagrees. "People who now work with computers show up at the office after having seen a (computer) movie and they laugh about how silly it is." In the future, Rubin says, computers won't be bad guys in movies; they'll just be a fact of life.

Whether or not movie computers remain bad guys, remember that these mean screen machines are almost always entirely a product of someone's imagination. "We (the writers) know nothing at all about computers," stresses screenwriter David Newman. "There was a point early on in *Superman III* when Leslie and I asked, 'Shouldn't we do a lot of research?'

"Everyone said, 'No, no, just imagine it, because what's fun about this kind of film is to imagine.' Once you find out what can or can't be done, you're going to lose half the freshness of it. This is a *fantasy.*"

And reality is very, very different from these moviemaker's fantasies ...luckily for us humans.

BARBARA KRASNOFF is the author of Robots: Reel to Real.

HAL OF FAME CONTEST *– Invent your own computer villain*

You've seen what Hollywood thinks about computers—and how far from the truth movie versions are. Now, we'd like you to use your imagination. If *you* were hired to write a Computer Monster movie, how would you portray the computer? Would you make it crazy like HAL, or super-competitive like JOSHUA? Would you create a whole family of *supercomputers,* or a mainframe that told jokes and had its own late-night TV show?

We'd like to see your ideas, no matter how far-fetched. Send us a description of your movie—the characters, a drawing of one of the scenes, or even a list of the actors you'd cast in the film. If we really like your movie idea, we'll print it and send you an ENTER t-shirt. Send your MONSTER COMPUTERS to: **HAL of Fame Contest, ENTER Magazine, CTW, 1 Lincoln Plaza, New York, NY 10023**

Can You Talk Like a Hacker

AN ENTER QUIZ

Listen, even if you don't know a computer byte from a mosquito bite, learning to talk with computers is as easy as falling off a log—and you won't get as many bruises, either. You're probably familiar with a lot of computer terminology already—but how familiar? Could you pass for a computer expert—a "hacker" —if you had to? Test your computer-sense in the following situations which any computer fan, new or old, will face daily...well, maybe not daily...O.K., O.K., you'll never face some of these ridiculous situations in a million years. But, at least by taking this test, you'll find out whether you can talk like a hacker when the chips are down. (The answers are on page 28.)

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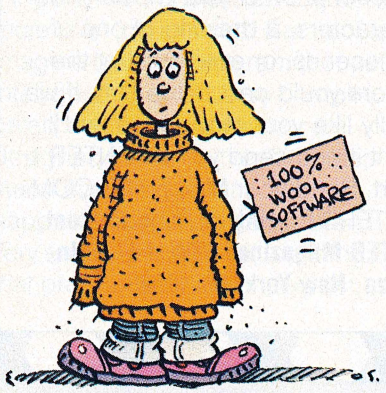
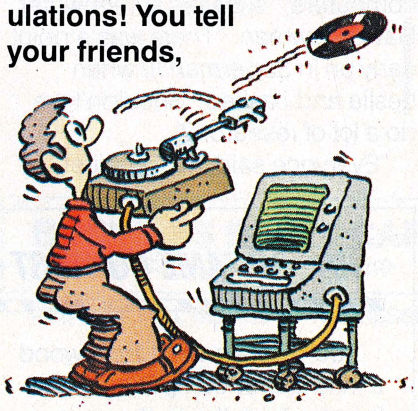
1. You've just walked into a computer store and the salesperson wants to show you some *software.* What happens next?



A. She shows you the latest foam rubber forks, knives and spoons.
B. She measures you for an angora sweater.
C. She shows you hardware that was left sitting on a radiator too long.
D. She shows you some video games on cassettes or disks.

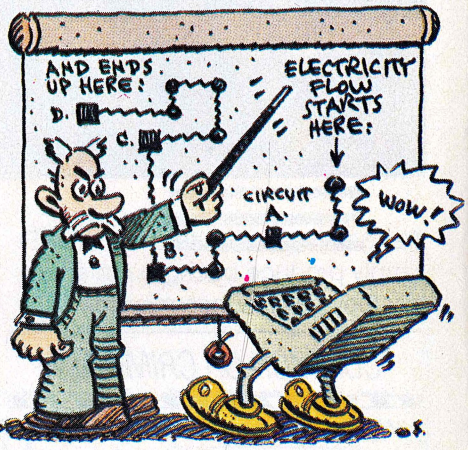
2. By the time you get out of the computer store, you are the proud owner of a new computer. Congratulations! You tell your friends,



and the first thing they say is "You're going to need a *disk drive.*" Right! But what's a *disk drive*?

A. It's a campaign to collect all the record albums you can find to give to the poor.
B. It's a saucer-shaped space outside your garage to park your car in.
C. It's a machine that plays the floppy disks.
D. It's a musical attachment for your computer music LPs.

3. You've quickly become a hot-shot computer freak. So guess



what you're ready for? Programming! Before you start, you'd better make a *flowchart.* This is:

A. Easier said than done.
B. A diagram showing the steps the computer should follow.
C. A chart that shows how the electrical wiring "flows" in the computer.
D. A map of all the rivers in your state.

4. It's a disaster! You were inventing the most fantastic video game since "Space Wimps"! And then you accidentally turned your computer off, erasing everything. "I thought computers were supposed to have *memory,*" you say to the local

ILLUSTRATIONS © ELWOOD SMITH

When the Chips Are Down?

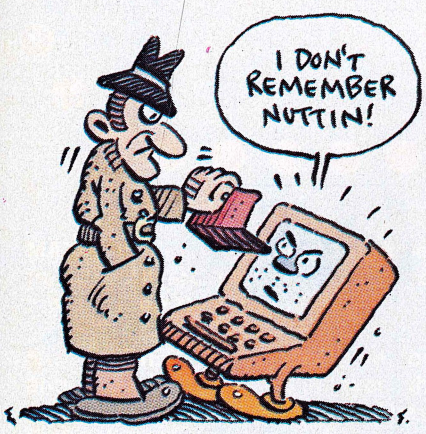
BY MEGAN STINE & H. WILLIAM STINE

expert. "Let me tell you about *RAM*," the expert replies. *RAM* stands for:

A. Really Awful Memory, which is why the computer erased your game.

B. Reckless Alice Maltin, a woman who accidentally erased 200 programs and is still laughing about it.

C. "Read After Mistakes"—a booklet that makes you feel bad about messing up on a program.

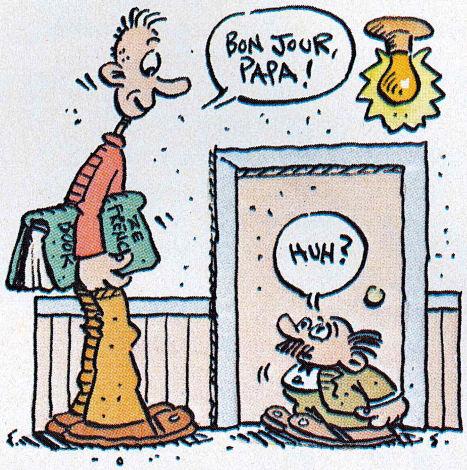


D. Random Access Memory—the erasable and reusable part of your computer.

5.

You pass a note to a friend in class, asking, "How can I learn to program?" Your friend writes back saying "You've got to learn a *High-Level Language.*" What does your friend mean?

A. You should take French or Latin next term.



B. You should take French or Latin on top of the Empire State Building (You can't get much higher-level than that!).

C. You should learn BASIC—or another language that computers understand.

D. You need to spend at least five years studying computers.

6.

You go to computer camp and make new friends. When you get home, you can't wait to "talk" to them—computer to computer. But you must wait—until you get a *modem,* which is:

A. A piece of equipment which hooks up your computer to another computer through the phone lines.

B. What you did to the lawns in your neighborhood.

C. A *medom* spelled backwards.

D. A dessert made out of frogs and hot cherry sauce.

7.

Bit by bit you are becoming best friends with your computer. In fact, you've even heard the word *bit* used a few times and you're ready to find out what it means. Go on—take a stab at it. A bit is:

A. What's left after you eat a blum.

B. What you did when you fell for the joke in answer (a).

C. A metal bar with reins that goes in Steve Martin's mouth—also known as a "comedy bit."

D. Short for *b*inary dig*it*.

8.

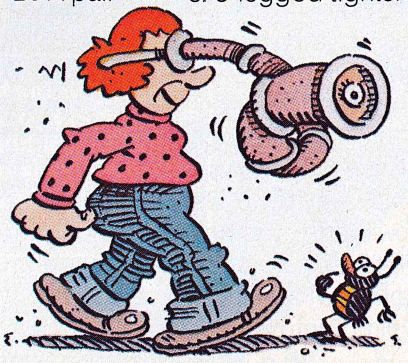
It's your birthday, and your parents ask you what you want. "I want *peripherals!*" you reply. You'll be happy if your parents think this means:

A. A dessert made out of frogs and hot cherry sauce (honest!).

B. Any accessories for your computer.

C. Special glasses that help your peripheral vision.

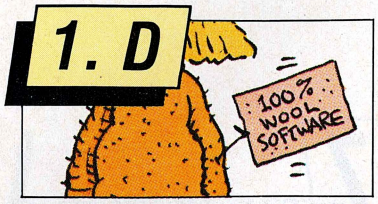
D. A pair of 3-legged tights.



Answers

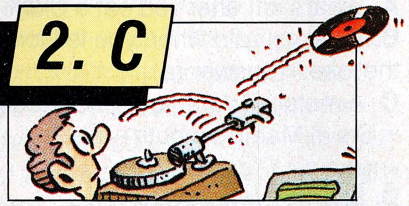
CAN YOU TALK LIKE A HACKER?

1. D



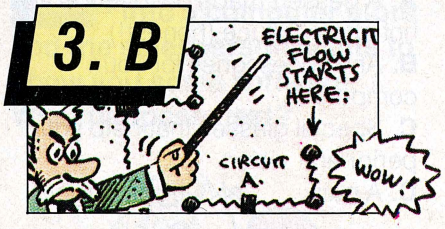
All computer programs are called *software,* whether they're programs you write yourself or the ones you can buy on disk or cassette. All the other stuff—the computer itself and the equipment you need in order to run a program—is called *hardware.*

2. C



Disk drives are like record turntables for the computer world. If the programs you want are on disks, then you need a disk drive to run them. You can also get software in cassette form and play it on a regular cassette tape recorder. But disks are a whole lot faster and much more efficient.

3. B

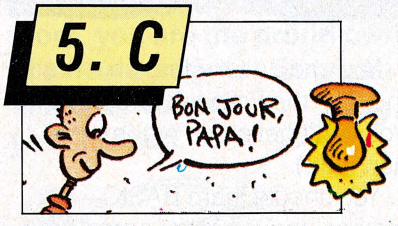


You've got to be really organized to write a computer program, and *flowcharts* help you do that. They're made up of a bunch of boxes and circles with arrows showing you which way to go. Best thing about flowcharts: they help you catch your mistakes before you've done all the work of writing the program and typing it into your computer.

4. D

Random Access Memory, or *RAM,* is like a scratch pad where the computer "writes down" everything it needs to remember. When the power is turned off—or even if the lights flicker for a second—all the data in RAM disappears...forever! So if you want to save something you've typed into RAM, you've got to transfer it to a disk or cassette. Don't confuse RAM with ROM, which stands for Read Only Memory. ROM holds data that has been permanently fixed in the computer. The computer can only read this memory—not erase it.

5. C



BASIC is the easiest *high-level* language to learn—and it's a whole lot easier than Latin or French! It certainly won't take you five years to learn. It uses some English words and symbols like these: $ # & !

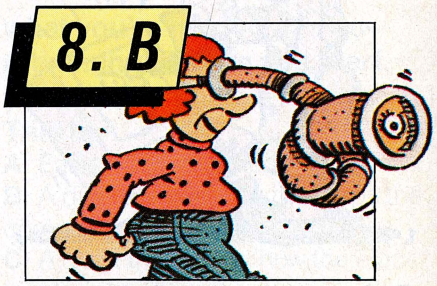
6. A

Thanks to the phone company, your computer can talk to one or hundreds of other computers all over the world through phone lines. Whatever you type onto your keyboard shows up on your screen and, for instance, your long distance friend's screen at the same time. Then your friend can type back, and you instantly see the reply. The small piece of equipment you need to connect your computer to the phone is called a *modem.*

7. D

No matter how smart computers *look,* they really only understand two things: ON and OFF. That's all the millions of tiny little electronic circuits in your computer want to know: Should I be on or off? So computers work on a *binary digit,* or two-number, system. That means that you only use two numbers—0 and 1—to tell them what to do. *B*inary dig*its* are called *bits* for short. It takes 8 bits to print a letter—for instance, 01100010 might stand for the letter A. A different arrangement of 0's and 1's would stand for B. Fortunately, you don't have to use binary digits to talk to your computer because it has been programmed to understand a higher- level language like BASIC. But inside, it all comes down to 0's and 1's.

8. B



Hope you didn't want 3-legged tights for your birthday, because *peripherals* are computer accessories. For instance, you can add a printer that will type out copies of whatever information you have in your computer. That's a peripheral. So are disk drives, joy sticks, the TV screen or monitor, and the typewriter keyboard. In fact, anything other than the actual circuits that do the computing is called a peripheral.

MEGAN STINE and H. WILLIAM STINE are the authors of many funny books.

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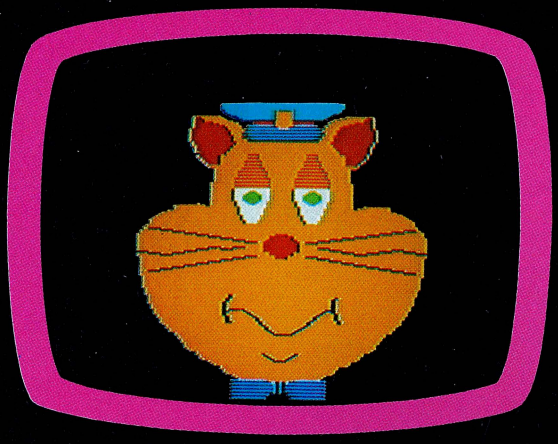

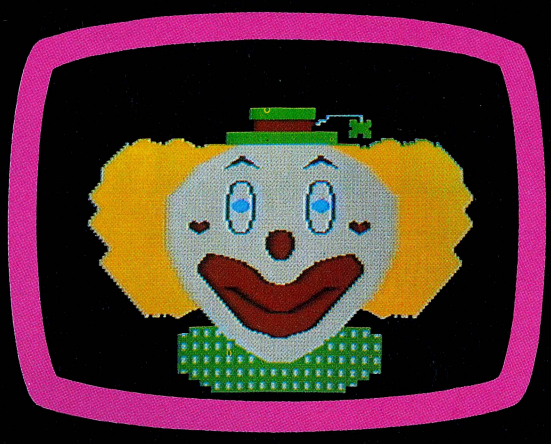

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COMPUTER SHOP
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Buying the Right COMPUTER

Knowing What You Need, Getting What You Want

BY BILL CAMARDA

"How do you buy a computer? What do you need to know? When will prices come down?" These days, everyone is curious about the ins and outs of computer buying. Mothers and fathers, positive that they can use a computer—"It'll be good for the kids, if nothing else"—seem ready to plunk down hundreds of dollars without any real sense of what they're buying, or why.

Well, you don't have to go that route. Even if your parents are confused about pixels and bits and RAM and ROM, you can help show them what to do.

The Big Question: What's It For?

The first thing any computer buyer absolutely *must* know is: what are you going to do with your machine? Buying a computer isn't buying a toaster. When you buy a toaster, you know it's really only capable of doing one thing: burning bread. But computers can be used for dozens of different tasks. And the best computer for one activity is often not the best computer for another activity.

So, before you do anything else, decide: what's your reason for buying the computer? Do you want it mostly to play video games? To make up programs? To help with your homework? Maybe a little of all of these? Well, then, what's most important? What's second in importance? Make a list.

Here are the factors we considered important, and which we will cover in this article:

- How good is it for *game playing*?
- How good is it for *programming*?
- Is it compatible with your *school computer*?
- Can you get good *educational software* for it?
- What if you get confused? Does the company offer *help*?
- How much will it *cost*? Will you have to pay a lot for "extras"?

Playing Games

Say video games are first on your list. "In that case, the machines with the most software (programs) are the ones you'll be happiest with," according to Annie Fox, who taught computing to thousands of kids and adults at the Marin Computer Center in California.

In general, the best-selling computers have more software available than other less-known computers. So far, more game software has been made for the Apple and Atari computers than any others.

PHOTOS © MARK KOWSLOWSKI

The amount of software *isn't* the only thing to consider when thinking about games, however. Colors are also very important. If your computer has eight colors, it won't be as dazzling to play *Centipede* as it would be if it had 16.

Even if you have a lot of colors, they may not be very sharp. That's determined by the number of pixels (picture elements) the screen is divided into. The more pixels, the sharper the graphics can be. Some machines, like the little Timex/Sinclair, have only 24 graphic characters—which means things will be rather fuzzy. Other machines have thousands of pixels. The Atari machines, for example, have 320 pixels down and 192 across. That's a lot better. (For specific information about the most popular machines, see the chart below.)

On some computers, you can buy special additions that add better graphics (called "high resolution" graphics). If you're buying a machine with a low number of pixels, ask if you can add high-res graphics later.

Creating Programs

Maybe you're tired of playing someone else's games, and you want to make up your own. Or you want to try and make up a program for ENTER's "Basic Training" column. Then, you need programming capability, and that means you should check out things like *memory, language* and *keyboards.*

MEMORY: Find out how much memory—RAM and ROM—the computer comes with. *ROM* is the memory built into the computer, information which you can't erase. It is usually necessary for the running of the machine—it includes things like adding, subtracting, and the computer's operating instructions.

RAM is erasable memory, where you can store "temporary instructions"—such as the information from a game disk or cassette.

BUYER BASICS: A Guide to the Most Popular Computers

COMPUTER	APPROXIMATE PRICE*	MEMORY (RAM) MIN.-MAX./ (ROM)	BASIC INC.?	COLOR? (HOW MANY?)/ SOUND?	KEYBOARD	MONITOR INCLUDED?	STORAGE MEDIA
TIMEX/ SINCLAIR 1000	$49.95	2K-16K** /8K	Yes	No/No	Membrane	No	Cassette
ATARI 400	$150	16K** /10K	No	128/Yes	Membrane	No	Cartridge, Cassette
ATARI 800	$500 (minus rebate)	48K /10K	Yes	128/Yes	Full	No	Cartridge, Disk, Cassette
ATARI 1200XL	$800	64K /24K	Yes	128/Yes	Full	No	Cartridge, Disk, Cassette
APPLE IIe	$1395	64K-128K /16K	Yes	15/Yes	Full	No	Disk, Cassette***
COMMODORE VIC-20	$85	3.55K-32K** /5K	Yes	16/Yes	Full	No	Cartridge, Disk, Cassette
COMMODORE 64	$199	64K /20K	Yes	16/Yes	Full	No	Cartridge, Disk, Cassette
RADIO SHACK COLOR COMPUTER	$199.95	16K-32K /8K	Yes	8/Yes	Chiclet†	No	Cartridge, Disk, Cassette
RADIO SHACK MODEL 4	$999	16K-128K /14K	Yes	No/Yes	Full	Yes	Disk, Cassette
IBM PERSONAL COMPUTER	$1265	64K-512K /40K	Yes	16/Yes	Full	No	Disk, Cassette***
TEXAS INSTRUMENTS 99/4A	$100	16K-48K /26K	Yes	16/Yes	Full	No	Cartridge, Disk, Cassette

When you shut the computer off, this information disappears from its memory. RAM numbers ("16K") tell you how much information your computer can handle at one time.

If your computer has only 2K or 5K RAM, it can't do very much (K stands for 1,000—2K is 2,000 bytes of memory). 16K is better—you won't need more than that at first. Just make sure you can add more later.

LANGUAGE: Does the computer come with BASIC language already built into ROM? If not, find out how much it will cost to add BASIC to ROM.

KEYBOARD: Is there a full keyboard? That's almost a must if you'll be doing real programming. Some computers, like the very inexpensive Timex/Sinclair and the Atari 400, come with flat "membrane" keyboards. You have to press the "painted on" keys really hard. It's a pain. (Obviously, these are not the best machines for a serious programmer, or someone who wants to become one.).

School Computers

Then there's school. If you've been learning on a school computer, how important is it that you buy the same kind for your home? People disagree about that. Barbara Garris, who compares computers for the Educational Products Information Exchange, thinks it's very important. "If I had the money, I would be 100% sure I had the same things" as the school, she says.

Sandy Pomerantz, who runs the educational computing division of Software City, a private company, doesn't agree: "In the end, I don't think it matters. Knowing two computers is better than one."

Decide for yourself. If you buy a different computer than your school's, you almost certainly won't be able to borrow programs from their machines to use at home. You also won't be able to work on programs at home that you can run at

KEY TO SYMBOLS:

**Prices are common retail prices as of June 1983 for the "stripped-down" computer with no options added. Many prices have been reduced further.*

***Some other companies sell attachments to expand memory further, but the manufacturer won't fix them or answer questions about them.*

****Yes, you can store your own stuff on cassette, but don't expect to find much cassette software to buy.*

†A "chiclet" keyboard has small keys that don't move quite as far as regular "full" keyboards.

LANGUAGES AVAILABLE	GAME/EDUCA. SOFTWARE AVAILABILITY	RESOLUTION (OR GRAPHICS CHARACTERS)	WARRANTY/ SERVICE	EDUCATION/ SUPPORT	USER'S GROUPS	COMMENTS
BASIC	Fair	24 gr. ch.	90 days/1 service ctr.	Some dealers, other books	75	Least expensive
BASIC, Pilot LOGO, Pascal	Excellent	320x192	90 days/local "Atari Service" ctrs.	Dealers, Atari Computer Camps	275	Great graphics, no built-in BASIC
BASIC, Pilot LOGO, Pascal	Excellent	320x192	90 days/local "Atari Service" ctrs.	Dealers, Atari Computer Camps	275	Full keyboard, BASIC, great graphics
BASIC, Pilot, LOGO	Good	320x192	90 days/local "Atari Service" ctrs.	Dealers, Atari Computer Camps	275	Not all Atari 800 programs available yet
BASIC, Many others	Excellent	40x48, exp. to 280x192	90 days/local dealers	Dealers, Technical hotline	300	Most software of any computer
BASIC, Forth, LOGO, "Comol"	Fair	178x184	90 days/local warranty. After, repair charge.	Some dealers, technical hotline	120	Strong on hardware, weak on software
BASIC, LOGO, Pilot, Forth, Pascal	Fair	320x200	90 days/local warranty. After, repair charge.	Some dealers, technical hotline	120	Great price, weak on software
BASIC, LOGO	Fair-Good	Expandable to 192x256	90 days/200 repair centers	Dealers, in-school programs	Many in large cities	$100 adds graphics and 16K
BASIC, Pilot, Pascal, Cobol, Fortran	Good	Expandable to 640x240	90 days/200 repair centers	Dealers, in-school programs	Many in large cities	Runs older Model III programs
BASIC, Pascal, Fortran, Cobol	Fair-Good	320x200 color 640x200 b&w	90 days/112 service/exchange ctrs.	Dealers	30 regional many in large cities	IBM buyers tend to spend more than $1265
BASIC, Pascal, LOGO, Pilot	Good	192x256	90 days/1 service ctr.	Some dealers "TI Advantage Club" classes	106	TI sells lots of educational programs

school without changing them first. It'll be a little harder for your teachers and classmates to help you with your home computer.

But while computer languages are slightly different from machine to machine, the general principles are about the same. So, much of what you learn in school would help at home.

Homework Helpers

If you'll want educational programs in subjects like math, English and languages, be extra careful. Find out if the software is available *before* you buy the machine. Speak to people who sell programs first. Sandy Pomerantz fills software orders from around the country, and she says there are a lot of programs available for really young children, a lot of college board preparatory-type programs, and not as many in between. She says she sees the most educational software for the Apple II, but, even there, it isn't all good.

Get Me Some HELP!

It's nice to know that if you get confused after you buy your computer that someone out there will help you. Some companies, like Apple and Commodore, have *telephone hot lines* that you can call to ask why you just made everything on the screen go blank. You're not alone!

Another important source of help is the *User Group*. User groups are a bunch of people who have the same hardware (machines) as you do. Since machine owners often have questions about their computers, they band together into groups where they can swap ideas and complaints and experiences. Apple and Atari boast over 250 groups each—which means that you can't be too far from a group, no matter where you live.

Finally, the store where you bought the computer may be of some help to you. Do you have a feeling that the salesclerk knows what he or she is talking about? Will she be willing to help you figure out any bugs in the system? If not, think twice about buying from that store.

What Does It Cost?

In fairness to whomever is paying for the computer, let's talk about money for a moment. A simple computer (a VIC 20, Timex/Sinclair, or TRS 80, for three examples) can now be bought for under $200. It

(continued on page 58)

For families who are serious about FUN...

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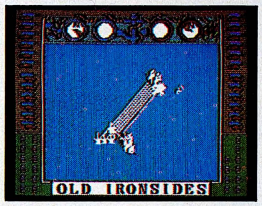

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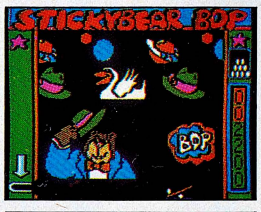

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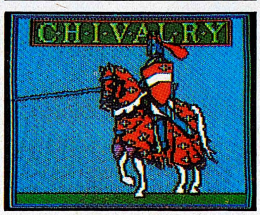

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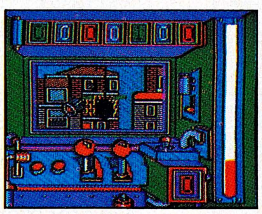

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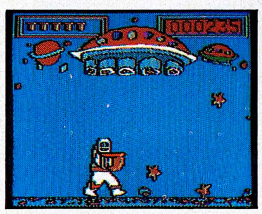

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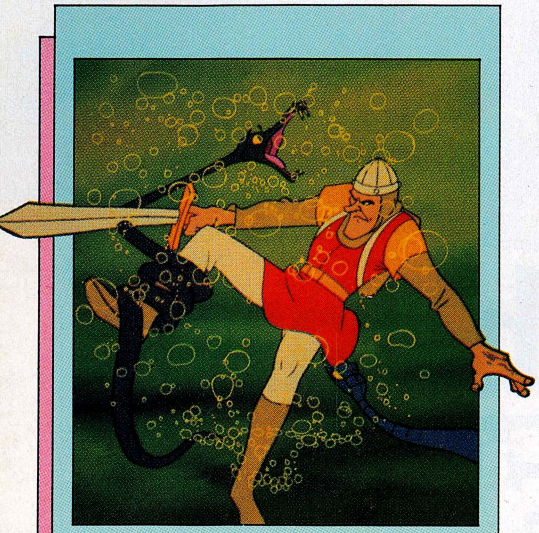
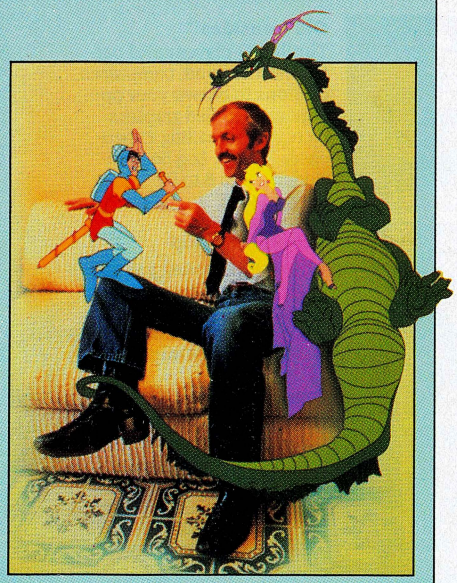
ARCADE

LASERS, ROCKSTARS

BY STEVE BLOOM





Danger awaits Dirk the Daring and* Dragon's Lair *designer Don Bluth as animation invades arcades this fall.

Pac-Man, Donkey Kong and other favorites will still be around when you enter the arcade this fall. But if you've got a sense of adventure, you might be tempted to try some of the season's new games. Here's what to expect.

LASERS ALIVE

Have you ever wanted to be a space commander in a science fiction movie? Well, *Astron Belt* from Sega gives you the chance. This game features special effects footage from a Japanese space movie and uses laser video disc technology (See "State of the Art," p. 40) to put you in charge of a space cruiser. Your computer-generated ship flies through the film footage; you, meanwhile, are using your joystick to blast alien ships and avoid oncoming asteroids.

In *Astron Belt,* outer space special effects are everything. *Dragon's Lair,* a sword-and-sorcery game from Cinematronics, has a special effect of its own: high quality Disney-style animation. In this game, you are Dirk the Daring, a swashbuckler who works his way through a very dangerous castle. While heading to the dragon's lair, Dirk encounters everything from snakes to raging fires.

Both disc games have their problems. One major drawback is that every time the scene changes—which is every few seconds—the screen goes black. "The *Astron Belt* effects are pretty cool," says Eugene Jarvis, creator of *Defender* and *Stargate.* "But it has too much black time."

Eon and the Time Tunnel (Laser-Disc Computer Systems) may overcome this problem by using *two* laser-disc players. In this way, when a scene changes, it won't be necessary to wait for the disc to find the next scene. Instead, the second disc can immediately project a new scene on the screen. This maze/adventure game, with its new technology, is due in arcades this fall.

But even these dual players will not solve another laser disc game problem: lack of player control.

In disc games, "You're limited to certain preset actions," complains Gene Jarvis. "All you have to do is time something and press a button. You make it or you don't. Personally, I'm into more freedom."

SPACE RACE

If it's freedom you're seeking, *Sinistar* (Williams) may be more your type. This computer-generated game has graphics that almost rival the laser discs, and it even features an evil, talking villain to challenge your space-shooting skills.

Sinistar marks a return to the kind of game that was eating up quarters before *Pac-Man, Donkey Kong* and their successors came along.

ARRIVALS

AND PAC-MAN, PH.D.

These space shoot-'em-ups never disappeared. They just have been quietly observing the crowds around *Pac-Man* from a distant corner of the arcade. With the arrival of *Sinistar, Mad Planets* (Gottlieb) and *Gyruss* (Centuri), it appears the space race has started up again.

Tim Skelly, arcade game designer of *Reactor, Star Castle* and several space games, is glad to see space making a comeback. "In space there is no reality," he suggests. "It's an excuse for black backgrounds and making up your own rules."

JOYSTICK ROCK 'N' ROLL

Journey, a rock band that entered the video world last year, is making its own rule about arcade games. The *Journey* game, originally introduced by Data Age as a home video game, is coming to arcades —the very first home game to be converted into a coin-op.

The aim is the same in the arcade as at home—to get the band's members to the concert. To do so, they must brave a minefield of groupies, photographers, agents and promoters. But Bally, which purchased the arcade rights from Data Age, altered the home version to bring it up to arcade gaming standards. The home game band members were stick figures. For the arcade version, the faces of the Journey-men are represented in

ABOVE: ***Journey and drummer Steve Smith will be on screens*** *(RIGHT)* ***at arcades everywhere. Their game*** *(BELOW)* ***is the first to go from home to coin-op.***

ABOVE: ***Xevious, like many new games, adapts to your skill level.***

ARCADE ARRIVALS

LASERS, ROCKSTARS AND PAC-MAN, P.H.D.

quite remarkable detail. You should be able to recognize your favorite, if you have one, among the band members. The arcade version, in fact, features a special treat for Journey fans. If you are able to get as far as the concert sequence, the game plays a recording of Journey's hit, "Separate Ways."

Don't expect Journey's game to start a stampede from home to arcade. As game designer Tim Skelly notes, "Most home games are distressingly low quality. It's no wonder they aren't being licensed by arcade manufacturers."

But while arcades may be sidestepping home games, they are pursuing movies and other hot-commercial properties with a passion. Last year's *Tron* (Bally) was the first movie-to-arcade game conversion. It proved so popular that the game actually made more money than the film it was based on. Arcade games based on such megahits as *Star Trek* (Sega) and *Star Wars* (Atari/Lucasfilm) will never match this feat, but will most certainly attract game players' attention.

Arcade manufacturers are so excited by the movie-to-game concept that they have even started planning games for movies still being made.

Space games return to the arcades.

THE PAC IS BACK

If you don't want to travel into uncharted movies, you'll find some familiar faces in *un*familiar places.

For starters, there's *Professor PacMan,* the fifth incarnation (for those of you who have lost count) of the little yellow gobbler. This *Pac* is not a maze game, but an IQ test that works best with two players. More than 500 questions are programmed into the game's memory. The object is to answer the questions faster than your opponent and to achieve a higher score. If you don't answer the word games, puzzles and memory teasers quickly enough, Professor Pac-Man at the top of the screen gobbles up all of your points.

Professor Pac-Man, designed by the Dave Nutting Associates subsidiary of Bally, is a throwback to the quiz-type arcade games that were very popular during the 1960s. Many of those old games were designed by Dave Nutting himself.

"I hope it does well," says Tim Skelly of *Professor Pac.* "Just don't expect it to revolutionize gameplay." Will a kid who has just flunked—or even passed—an algebra test want to take another quiz at the local arcade?

Another new game with a familiar face is Nintendo's *Mario Bros.,* featuring Mario from *Donkey Kong,* Mario's twin brother Luigi, and a whole new cast of pests. The game is similar to *Joust* in two respects: the screen is filled with ledges that you hop to and from, and there's an option that allows two players to compete at once. It's hard to imagine any more spinoffs from these characters.

Even before the first quarter hits the slots of this year's new arcade game, the game makers are looking towards next year's games. "The new wave will be 3-D objects, like the objects in *Xevious,* with 2-D gameplay," says designer Gene Jarvis, who is developing a hardware system that will help make such graphic improvements possible.

Also watch for more games, again like Atari's *Xevious,* that are programmed to get more difficult as you become a better player. And expect, soon, to control the course of video screen events with voice commands instead of a blister-inducing joystick.

THE NEXT NEW WAVE

But the real arcade game revolution will come when you can control the action using brain waves and biofeedback. It may sound far-fetched, but experiments are underway at the MIT Research Facility in Massachusetts that could make mind games the most popular arcade adventure of the century.

STEVE BLOOM is the author of Video Invaders *and writes about video and music.*

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TRI MICRO

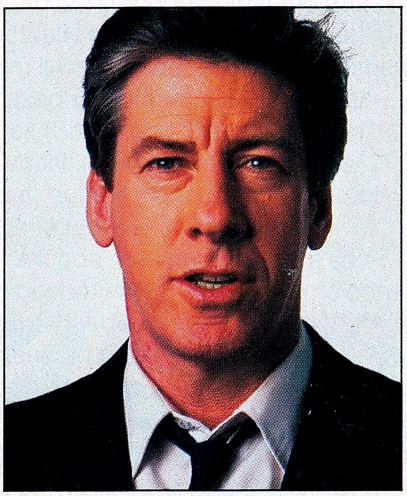
THE CURIOUS CASE OF THE VIDEO DISC

BY JIM LEWIS

Television detectives like Magnum and Matt Houston have it easy. One murder, one motive, one hour and the case is solved. I'm a private eye, too —Cavanaugh's the name, Stew Cavanaugh—but the cases I handle could have baffled Sherlock Holmes.

Take a case I call "Murder, Anyone?" There's a murdered millionaire and a mansion full of suspects. I search all over for clues, but it seems almost anyone might have been the murderer. Did the mysterious stranger fire the fatal shot? Or was it the family doctor? The spinster sister? And what about the butler? Why can't I be on television where the cases are easy, instead of stuck inside this laser video disc, where almost anything can happen and everything keeps changing?

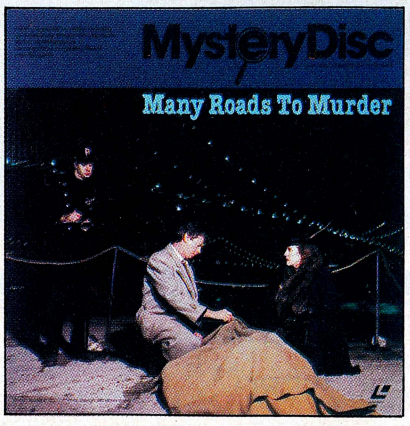
Stew Cavanaugh, private eye, isn't the only one who's a little puzzled by video discs. Since they were introduced less than 10 years ago, these record album look-alikes have been hailed by experts, but largely ignored by the public. It sounds like a great idea—a system that plays pictures and stereo sound on your TV in a way that gives you complete control. But turning that idea into an exciting, innovative product has proven difficult.



MICHELE SINGER

Stew Cavanaugh takes on only the toughest laser disc mysteries.

Stew Cavanaugh's cases are part of the *MysteryDisc* series from VidMax. (Two are available now—"Murder, Anyone?" and "Many Roads to Murder.") This series is one of the most creative video disc productions yet. It's a video game of sorts, but our hero Cavanaugh is much more than an electronic blip. He's a real actor whose videotaped exploits have been transferred to the video disc so that you can direct his investigation using hand-held control buttons. The sense of reality in Cavanaugh's cases, the feeling that you are participating at the scene of the crime, goes well beyond what any computer graphic game can offer.



***You* must solve the *MysteryDisc*.**

Inspired by new developments like the *MysteryDiscs*, the laser video disc world is finally beginning to grow. During the summer, two laser disc adventures appeared in arcades across the country: *Dragon's Lair*, an animated medieval encounter, and *Astron Belt*, a live action space fantasy. (See "Arcade Arrivals," p. 36.) Both of these laser disc arcade games use the same technology that keeps Cavanaugh on the case.

How do pictures get onto a record?

The video disc is like a plastic sandwich, with a thin slice of metal in the middle. At the factory, a laser burns tiny pits into this slice of metal. The pits represent the pictures and sounds that make up the video disc story. When the player's laser runs over the disc, it reads these pits and recreates the light and sound patterns on your TV screen.

Since the laser in the disc player does not actually touch the disc, a microprocessor can move it

among the pictures and sounds freely, playing scenes in slow motion or reverse, or even in a different order. You can shift from one soundtrack to another and even locate specific scenes in seconds.

This freedom is the key to the

makes it better than a videotape system for showing movies at home on your television. Since 1981, millions of CED movie discs and more than 300,000 CED players have been sold.

However, the real problem with

For Ages 6-10.

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☐ Enclosed is a separate sheet for additional gifts at $9.95 each.

SEND BILL TO:

MY NAME

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CITY

STATE ZIP

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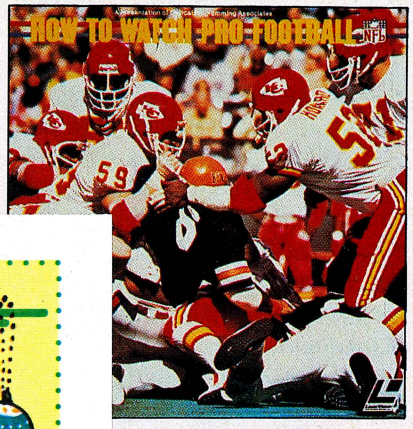
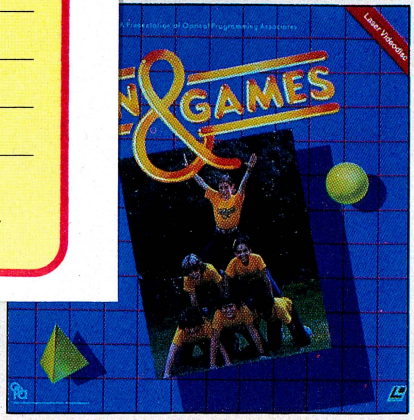


pro football fanatics...

tem's ability to slow down, or stop action. This lets good look at how world ns use martial arts to de- nselves or to turn a good board into a stack cks.

r OPA disc, *Fun &* ncludes basketball trick- t by Meadowlark Lemon rlem Globetrotters and visters untangled by n Bill Murray. A disc for children, "The First Na- lisc," gives a lesson in uage, takes a tour of a udio and is filled with doz- er intriguing activities. all this creativity, there are w discs that make the tem worth the price. good software will have to before people are won e laser video disc," says



...and for fun and game aficionados.

and it doesn't give you much control over what takes place on the screen. But it tends to be less expensive than the laser system, and the good quality of the picture

motion, freeze frame and reverse.

If the huddle holds no interest, how about kung fu? Like the pro football disc, the *World of Martial Arts* disc takes advantage of the

THE CURIO
CASE OF T
VIDEO DI

BY JIM LEWIS

Television detectives like Magnum and Matt Hous have it easy. One murder, one motive, one hour and the is solved. I'm a private eye, t —Cavanaugh's the name, Ste Cavanaugh—but the cases I could have baffled Sherlock H

Take a case I call "Murder, There's a murdered millionai mansion full of suspects. I se over for clues, but it seems a anyone might have been the Did the mysterious stranger f shot? Or was it the family do spinster sister? And what abo butler? Why can't I be on tele where the cases are easy, inst stuck inside this laser video where almost anything can ha and everything keeps changi

Stew Cavanaugh, priva isn't the only one who's a l puzzled by video discs. S were introduced less than ago, these record album look-alikes have been hailed by experts, but largely ignored by the public. It sounds like a great idea—a system that plays pictures

***You* must solve the *MysteryDisc*.**

the light and sound patterns on your TV screen.

Since the laser in the disc player does not actually touch the disc, a microprocessor can move it

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among the pictures and sounds freely, playing scenes in slow motion or reverse, or even in a different order. You can shift from one soundtrack to another and even locate specific scenes in seconds.

This freedom is the key to the *MysteryDisc* and laser arcade games. It enables you to follow hundreds of paths through the disc. Make the right choices and you can capture the murderer or slay the dragon. Make the wrong choices and you may fall into a bottomless chasm or take a long walk off a short pier.

This adventurous, real life action has many laser disc makers declaring a new era in video excite-

OPA has discs for maze maniacs...

ment, but the laser video disc system is hardly new. Introduced in 1978, the system has so far failed to live up to expectations. In five years, only about 80,000 laser disc players have been sold in the entire country.

Some experts feel the laser system's high cost—a disc player ranges from $500 to $1200—has kept it from becoming popular. Others blame competition from another, less sophisticated kind of system, the CED. The CED player uses a thin electrode, not a laser, and it doesn't give you much control over what takes place on the screen. But it tends to be less expensive than the laser system, and the good quality of the picture makes it better than a videotape system for showing movies at home on your television. Since 1981, millions of CED movie discs and more than 300,000 CED players have been sold.

However, the real problem with laser video may not be the cost of the system or even the competition, but the lack of exciting discs that make full use of laser control.

"The *MysteryDisc* is the first disc I've seen that really takes advantage of what the laser can do," says Kevin Barnes, who got his system last year. "Most of the other discs available don't let you do that much with the laser."

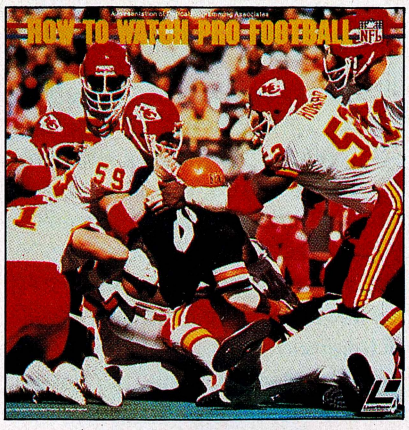
If you decided to get a laser disc today, you could buy a movie disc or you could buy one of the so-called "participative" discs made by Optical Programming Associates (OPA). These "participative" discs let you use the laser to search out specific information about things like poached salmon or jazzercise, but only one OPA disc—*Maze Mania*—lets you control characters in a video adventure.

Since poached salmon and jazzercise may not make you spend $1200 on a laser system, OPA has developed other discs which should be of more interest.

From comedy to kung fu

Football fanatics can learn from top coaches in the National Football League on a disc called *How to Watch Pro Football*. Sideline generals like Don Shula of the Miami Dolphins and Tom Landry of the Dallas Cowboys tell you how to get the most out of the pro game, and the laser lets you get a close look at on-the-field action in slow motion, freeze frame and reverse.

If the huddle holds no interest, how about kung fu? Like the pro football disc, the *World of Martial Arts* disc takes advantage of the



...for pro football fanatics...

laser system's ability to slow down, speed up or stop action. This lets you get a good look at how world champions use martial arts to defend themselves or to turn a perfectly good board into a stack of toothpicks.

Another OPA disc, *Fun & Games,* includes basketball trickery taught by Meadowlark Lemon of the Harlem Globetrotters and tongue twisters untangled by comedian Bill Murray. A disc for younger children, "The First National Kidisc," gives a lesson in sign language, takes a tour of a movie studio and is filled with dozens of other intriguing activities. Yet, with all this creativity, there are still too few discs that make the laser system worth the price.

"More good software will have to come out before people are won over to the laser video disc," says

...and for fun and game aficionados.

Chad Worcester of the Nebraska Video Disc Design/Production Group, an organization respected for its research and development of laser video disc technology. "The creativity is there, the hardware is there, but it will take time to get the right software."

It is very expensive to produce special, interactive laser video discs for the small number of laser system players now in use. "We are in a chicken-or-egg situation," says Worcester. The laser system players will not be sold until more special discs are produced, and the discs will not be produced until more players are sold.

Stew Cavanaugh's last case?

Technical improvements may bring down the cost of a system, suggests video disc expert Worcester. Perhaps these lower prices and improved products like *MysteryDisc* and laser arcade games will help attract new interest in laser's potential.

Perhaps there will be a breakthrough soon that makes everyone want to own a laser player. If not, detective Stew Cavanaugh's next case may be to find out who killed the laser video disc.

JIM LEWIS is associate editor of ENTER Magazine.

PROGRESS REPORT: VIDEO DISCS

COURTESY OF PIONEER VIDEO, INC.

WHAT THEY ARE: Video discs look like silver record albums played on futuristic record players, but with a video disc player you get sound *and* pictures on your TV screen. Programs available include movies, games, "how-to" lessons and action adventures. The quality of the picture and stereo sound is excellent.

TYPES: There are two types. The LASER SYSTEM (about 80,000 sold) gives more control over sound and pictures, letting you freeze frame, reverse, slow motion or search for specific scenes. The CED SYSTEM (more than 300,000 sold) uses no laser and gives less control, but is good for showing movies on your TV screen.

HOW MUCH THEY COST: The Laser Videodisc player costs between $500–$1200. The CED player costs between $250–$500. Discs for both systems cost between $20–$40.

WHERE TO GET THEM: Laser and CED systems are available at many stereo, electronics and department stores. Discs are also available at many of these locations, and at most video and some record stores.

WHAT'S NEXT?: More discs and lower prices for the laser system. More viewer control for the CED system. Videodisc systems may soon be connected to home computers, which will allow for even greater viewer control.

FOR AGES 10 THROUGH ADULT

THE ADVENTURE GAMES THAT TOOK 3,000 YEARS TO CREATE!

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The Bible is where our stories begin. But we've woven *new* adventures through high technology. With stirring action. Startling sound. Dazzling sights. Every member of your family will thrill to the realistic animation and the high-resolution graphics. And you'll share in the pleasures of this unique, new game source—the Bible.

The first of our Bible Adventure Games is *The Philistine Ploy.* Based on the biblical Book of Judges, it starts at a time when law and order have fled from the hills of Judea. It's a turbulent world of intrigue and revenge, altars and idols, heroes and justice. You'll seek the long-lost mythical Treasure of the Seven Nations, racing against a dangerous Philistine warrior who is trying to kill you! But you don't have to know your Bible stories to begin enjoying this adventure game.

Later this year, look for *The Lion's Share* based on the Book of Daniel. You'll be dropped into Babylon, a city filled with dreams, stargazers, wizards and savage lions!

The Bible Adventure Game Series is for Apple II+/IIe computer with 48K and one disk drive. **Games are $34.95 each.**

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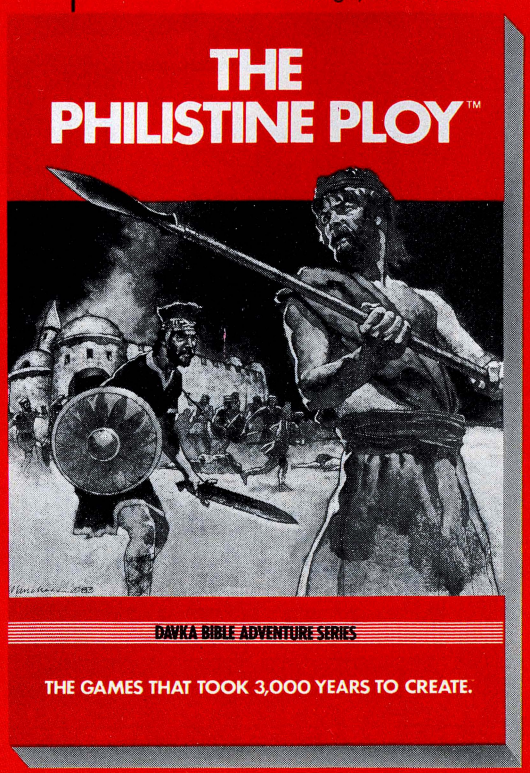

DAVKA ADVENTURE GAMES...WE TOOK OUR TIME.

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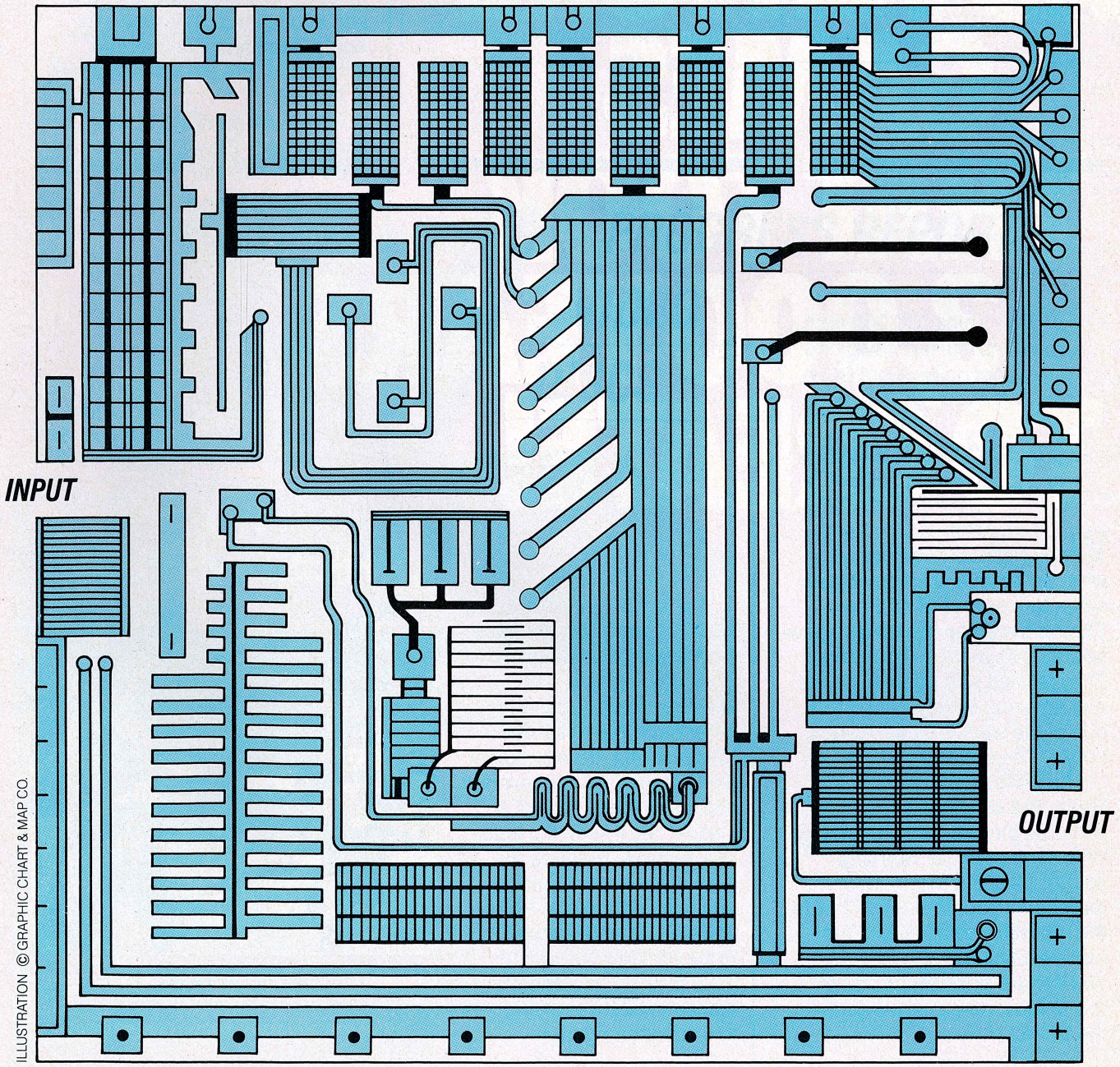
THE A-MAZE-ING CHIP

Inside today's computers are tiny silver-grey squares called *microchips*. These chips are so small that one can easily fit on your fingernail. They also are the heart of every computer.

Microchips are made from silicon, the same stuff that's found in beach sand. Believe it or not, each tiny chip is covered with *thousands* of passageways through which electronic messages travel. (To find out how these amazing chips are made, see page 46.)

Below we've given you a simplified version of a microchip. How fast can you make your way through the micro-maze, from input to output?

(ANSWERS ON PAGE 64)



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YOU'LL LIKE IT!

ACTUALLY, YOU'LL LOVE IT!

Here's why! TRIAD is nine separate pulse-pounding games in one package. Select one of nine weird alien menaces to battle from the Master Board. But careful — these guys can be tricky! Defeat three aliens in a row tic-tac-toe style and you earn a crack at the next skill level.

The whole neighborhood'll thrill to TRIAD's crisp colors, super sounds and the oddest assortment of alien "baddies" ever assembled on one screen. Snappy arcade excitement for all ages!

TRIAD — from Adventure International. Why get one game when you can have nine?

TRIAD — YOU'LL ~~LIKE~~ *love* IT!

(152)

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The Making of a CHIP

PHOTO © CHUCK O'REAR

What's made from sand, developed in a darkroom like a photograph, and baked in an oven until it's done? The mighty microchip! Tiny enough to rest on your fingertip (RIGHT), the microchip has sparked today's computer revolution. One chip alone houses the components that enable your computer to compute, your digital watch to tell time, or your video game to zap aliens.

The microchip era began in 1969 when Intel, a California electronics company, figured out how to shrink the main parts of a calculator onto four tiny silicon chips. Today, a single chip can contain an entire computer that is many times more powerful than the world's first digital computer, the room-sized ENIAC.

More than a million passageways are crammed onto the surface of these tiny specks of silicon. Electronic messages zip back and forth over the chip in less time than it takes you to blink.

To find out how the incredible microchip is made, read on.

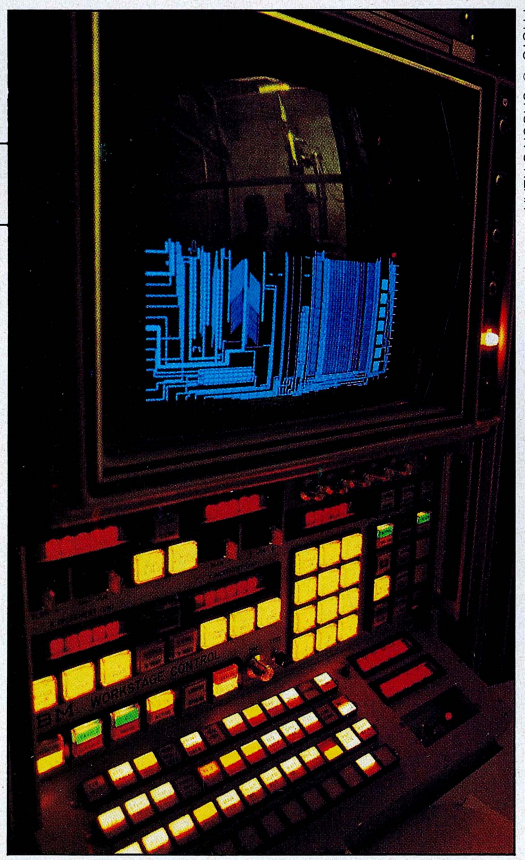
1

MAPPING THE MICRO

Imagine the intricate tangle of roads in a big city. Thousands of streets cross each other in varying patterns. Now, look closely at a microchip. It holds as many electronic paths as a city has roads!

Designing a chip is a complex job. First, a large map of the chip's paths must be made. The map can be done by hand on drafting tables—or on a computer *(RIGHT)*. Each line on the screen is a message channel.

This colorful map *(FAR RIGHT)* is a close-up of a chip design for a new video game.



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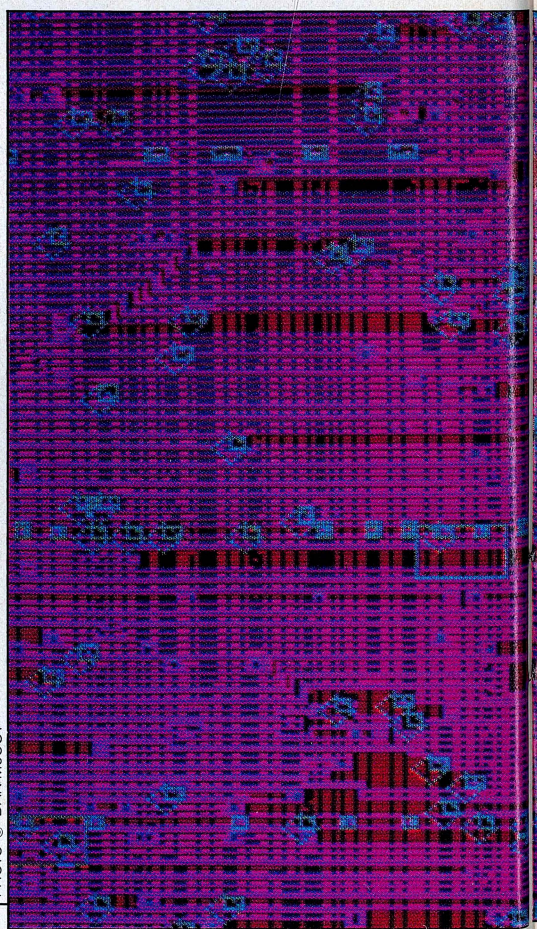


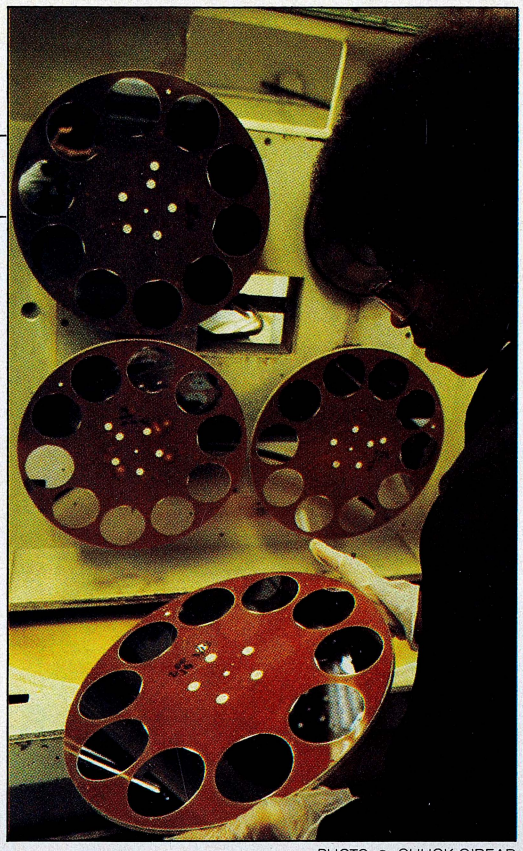
PHOTO © DAN McCOY

2

A CHIP IS BORN

Chips are made of silicon, the main ingredient of sand. To create a chip, the silicon has to be purified and made into crystals. This is done by heating sand grains in a tub.

As the silicon gets warm, it melts, and impurities sink to the bottom of the tub. When a bit of pure silicon is then dropped into the tub, the melted silicon clings to the pure silicon. It then cools and hardens into a log of silicon crystals. This crystal log is sliced into thin discs called wafers. The wafers are put on trays *(RIGHT)* and polished until they're mirror-smooth.



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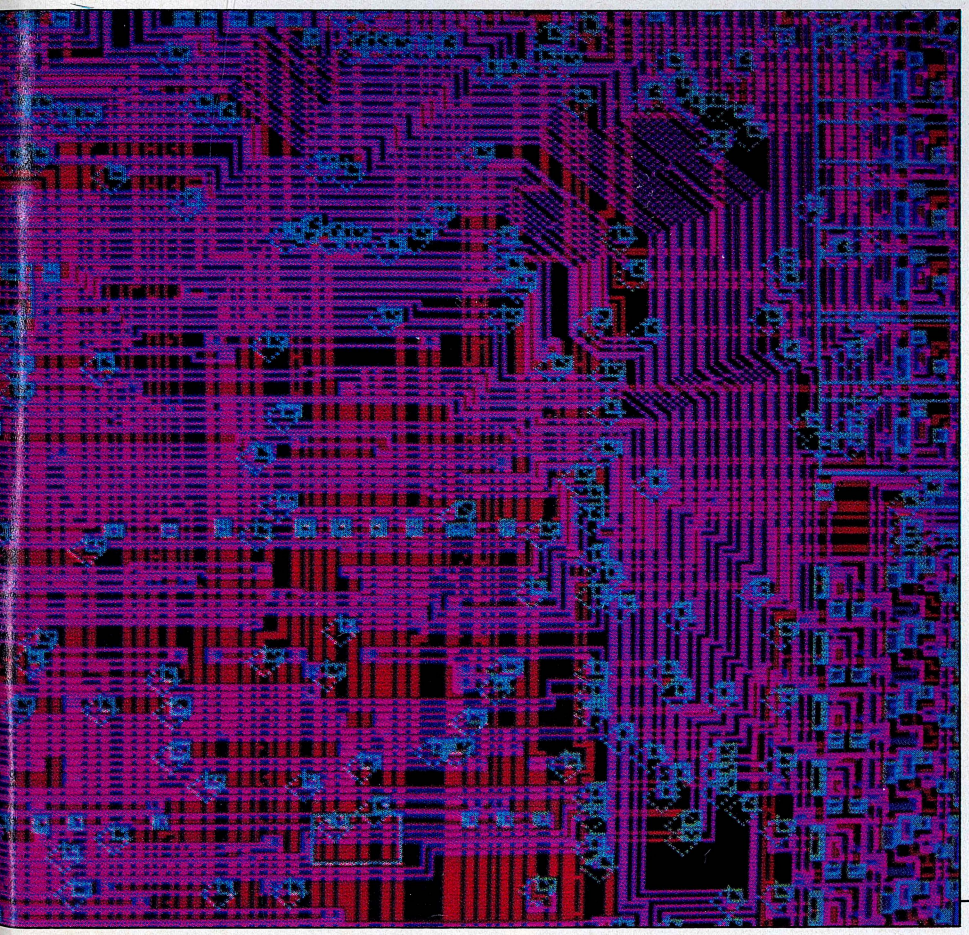

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CREATING THE ROADWAYS

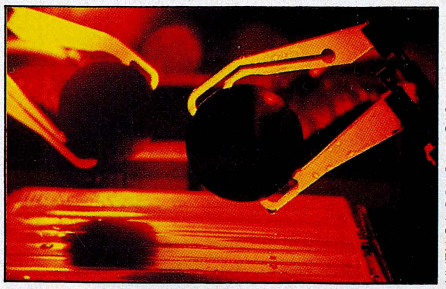
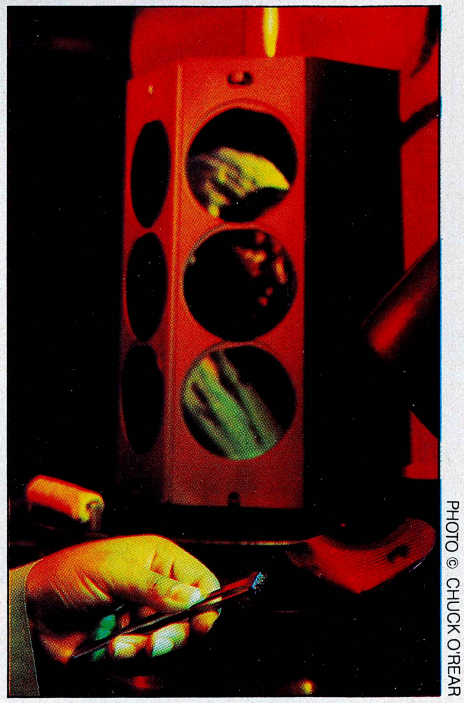


PHOTO © CHUCK O'REAR

In the eerie yellow light of a darkroom *(ABOVE)*, robot hands prepare wafers to be etched with grooves that will carry messages.

First, the wafers are coated with a substance that hardens when exposed to light. Next, a stencil of the chip's passageways is placed over the wafer. It is exposed to light and developed in a darkroom. Then, acid etches away the unhardened material that was covered by the stencil. As a result *(BELOW)*, intricate paths emerge on the chip.

(continued on page 48)



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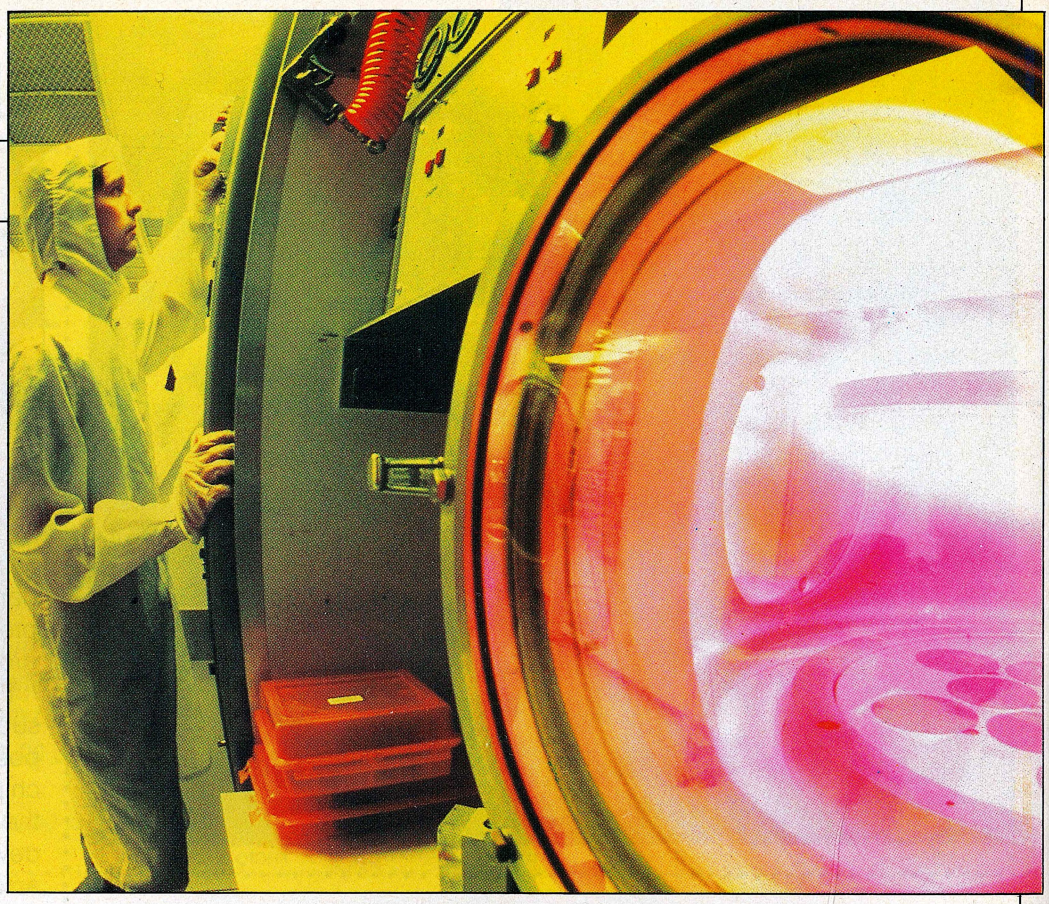
4

BAKING THE BITS

The recipe for making microchips now calls for baking some key ingredients into the wafers . The oven where this is done *(RIGHT)* must reach temperatures of over 1,000 degrees. Here, the wafer's pathways are paved with material that will carry electricity.

Hot gases mixed with metal are used to cover the baking wafers. This leaves a thin film of material along the pathways. Then, tiny pieces—called semiconductors—are embedded in the chips. Semiconductors can carry electricity, or they can block it. These on-off specks make up the computer's switches.



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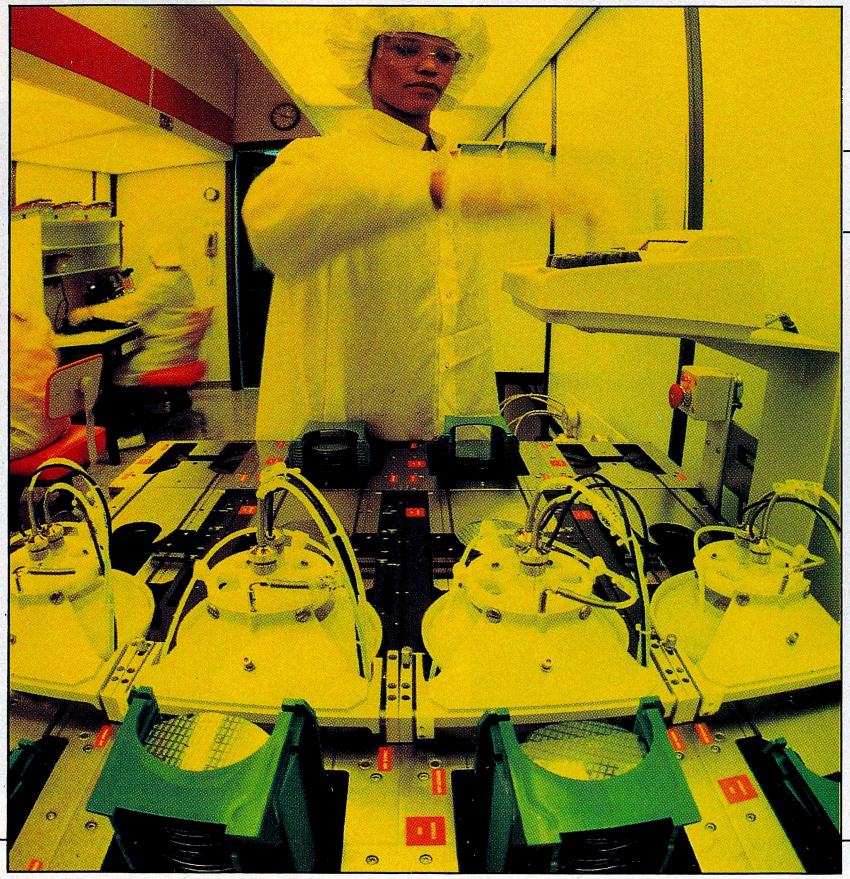

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5

CLEANLINESS IS CRUCIAL

The smallest piece of dust will seem as large as a boulder to the microscopic roadways of a chip. That's why great care must be taken to keep wafers *totally* clean. Chips are made in sealed, dust-free "clean rooms," where all workers dress like surgeons. Before they leave the room, chips are gently, but thoroughly, washed in special solutions. This worker *(LEFT)* is moving the wafers by punching instructions into a control box. Neither she, nor any other human, ever actually touches the fragile wafers.

(continued on page 50)

LOOK MA! NO HANDS!

Play on your feet, not on your seat.
Now you can play video games with your hands behind your back. With the Joyboard Power Body Control. There is nothing like it.

You lean, you tilt, you bend, you turn.
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What has the rest of you been doing while your hand has been playing Atari?
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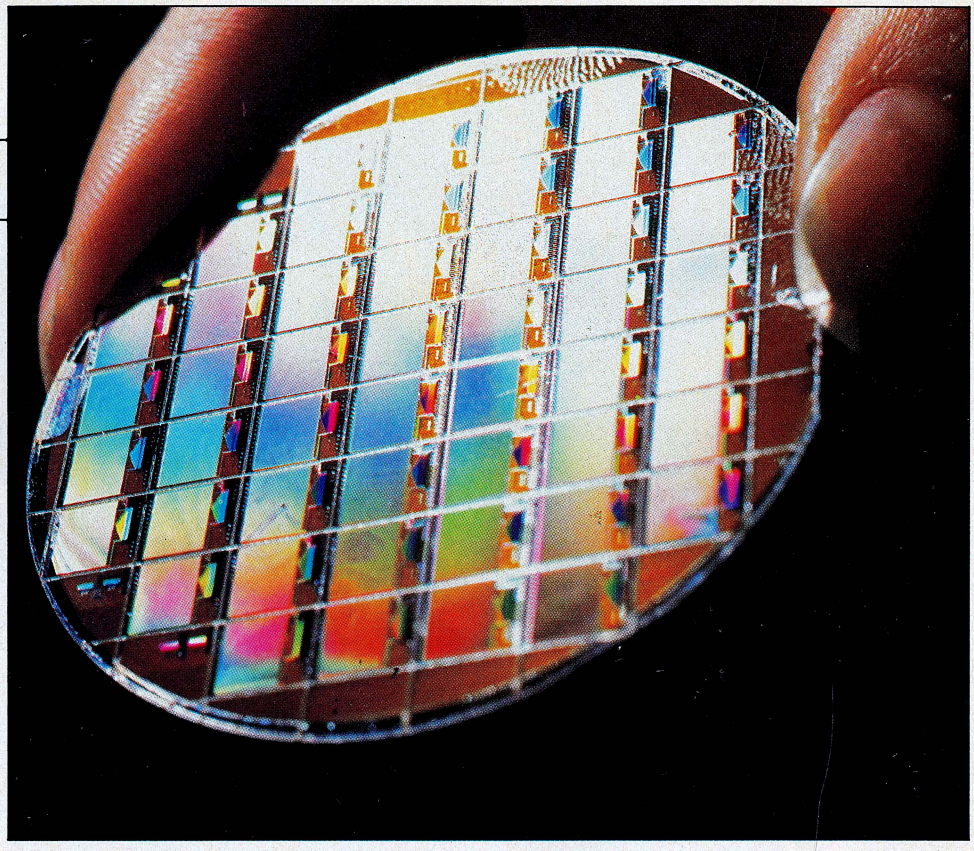
6

SEPARATING EACH CHIP

As small as this finished wafer *(RIGHT)* is, it contains 48 individual microchips. Some wafers hold up to 250 chips! Diamond cutters are used to detach chips from wafers. The microchips on this wafer are *memory chips*. They store information in a computer. Other chips have different jobs. The *microprocessor* chip, for instance, contains the pathways that handle a computer's arithmetic and problem-solving chores.



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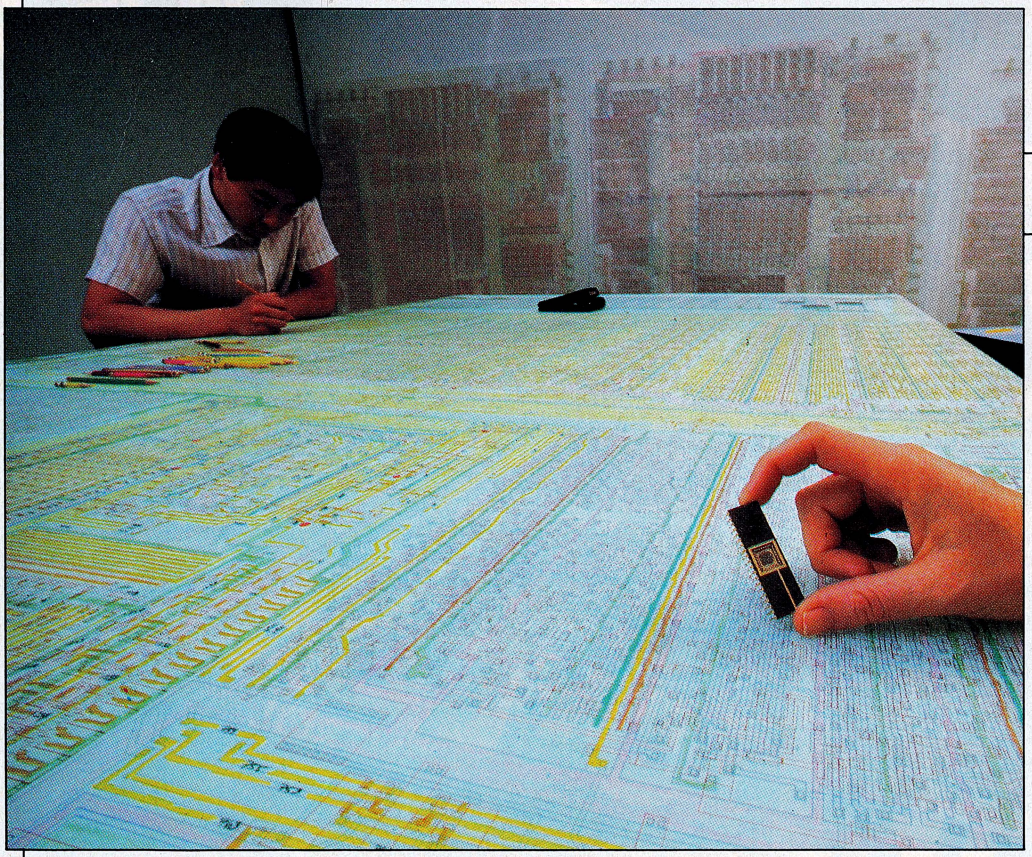

PHOTO © DAN McCOY

7

THE END PRODUCT

Here is the final product—a ready-made computer component with a microchip at its heart *(LEFT)*. The chip is sealed in a protective casing, and is plugged into a computer through the casing's prongs. All the pathways drawn on the blueprints covering the drafting tables and walls have been concentrated onto this miniscule speck of silicon.

For Atari® 2600™, Atari and Commodore Computers.
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Amazing new switching technology means twice as many contact points for more precise direction changes!
More control!
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Remember the name, or you can't win the game!
THE POWER-STICK
PRECISION JOYSTICK
HIGHER SCORES!
(Need we say more?)
Smaller, more playable size. No hand fatigue!
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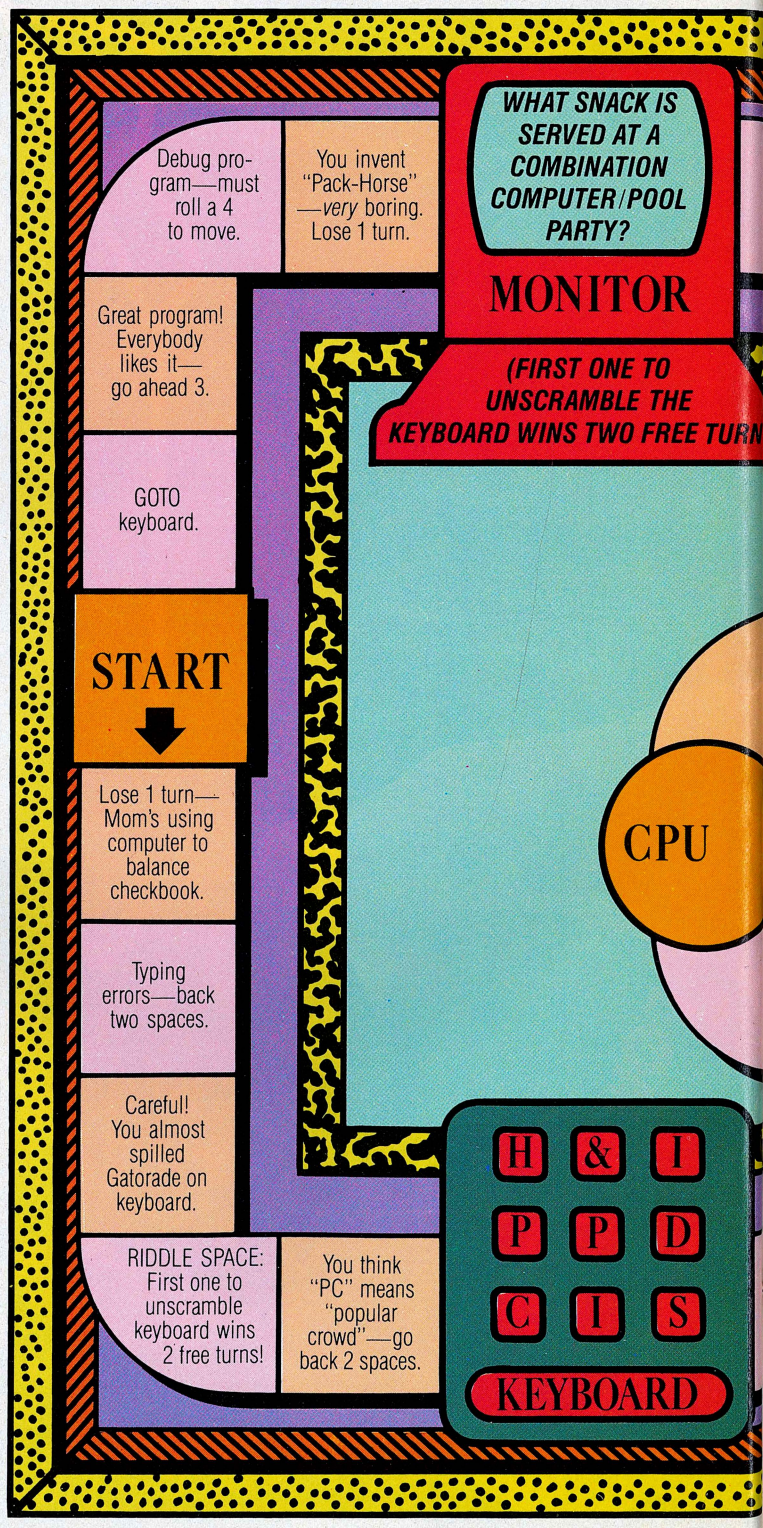
D·A·T·A

By Megan Stine and H. William Stine

Information doesn't just jump out of a computer. It has to go through a number of steps before it can be processed. These steps are known as the "data path." Our *DATA PATH is a board game for two or more players. You move around the board in a way that's similar to the way information moves through a real computer.*

Here's the story. You've just come up with a great idea for a computer game. You want to enter it into the computer, look at it on the monitor, then save it somewhere. You can save the program in one of three ways: (1) by printing it out, (2) storing it on a disk, or (3) sending it to a friend by telephone (using a nifty device called a modem*). The first person to finish his or her program* and *save it is the winner.*


WHAT SNACK IS SERVED AT A COMBINATION COMPUTER/POOL PARTY?
MONITOR
(FIRST ONE TO UNSCRAMBLE THE KEYBOARD WINS TWO FREE TURN
Debug program—must roll a 4 to move.
You invent "Pack-Horse" —very boring. Lose 1 turn.
Great program! Everybody likes it— go ahead 3.
GOTO keyboard.
START
Lose 1 turn— Mom's using computer to balance checkbook.
Typing errors—back two spaces.
Careful! You almost spilled Gatorade on keyboard.
RIDDLE SPACE: First one to unscramble keyboard wins 2 free turns!
You think "PC" means "popular crowd"—go back 2 spaces.
CPU
H & I
P P D
C I S
KEYBOARD

HOW TO PLAY

You need one of two dice and some kind of playing piece (buttons, coins, etc.). Begin by rolling one die and moving along the path to the keyboard. To perfect your program, you've got to type it into the computer!

Once it's typed in on the keyboard, the program must go through the *CPU,* the computer's central processing unit. That's where all the real "thinking" takes place.

After your first time through the CPU, you can store your program in *memory.* But then you want to view it on the *monitor,* so head that way. The program looks good, so you go back to start and a second turn around the data path.

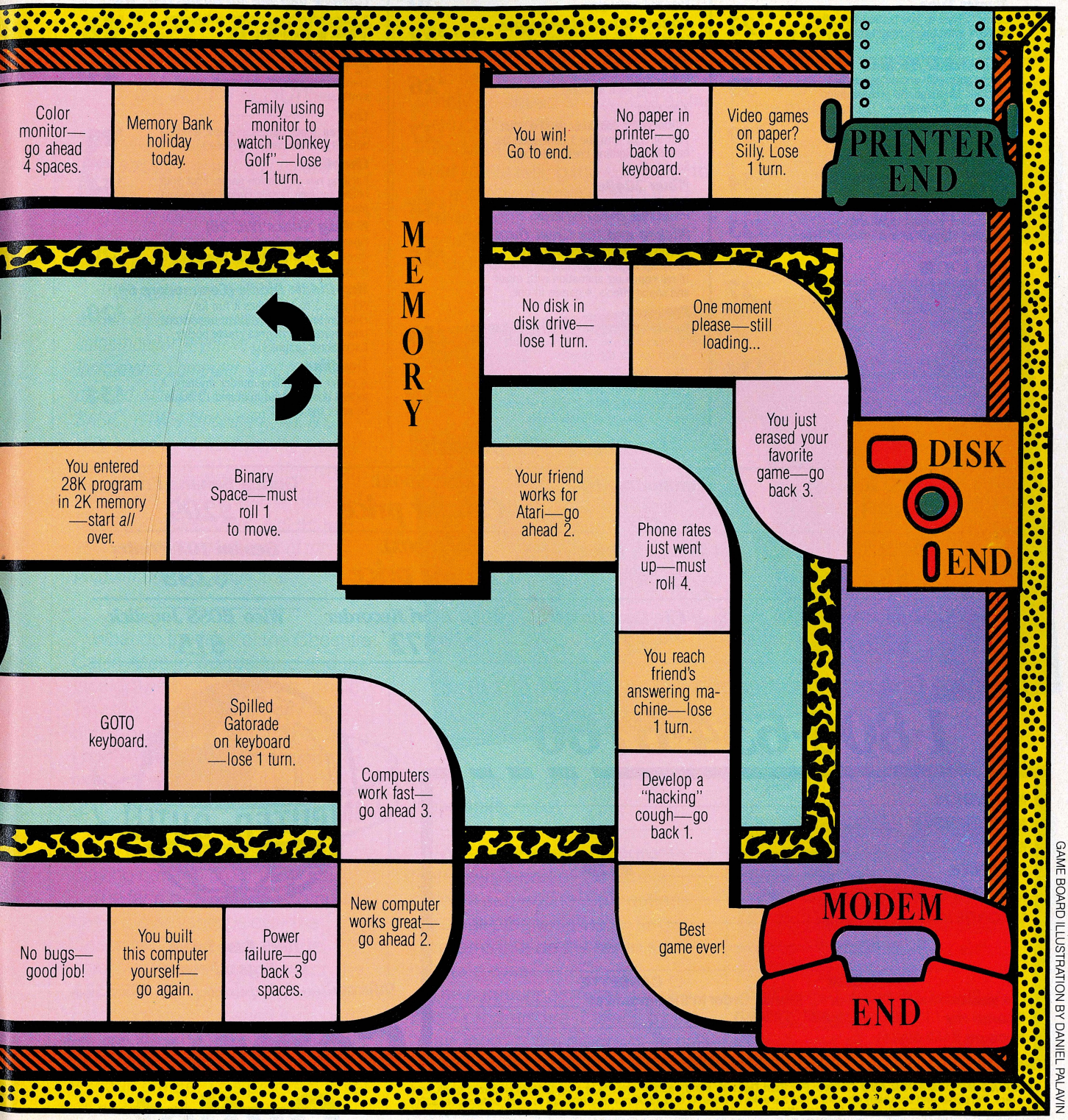
This time, everything works the same as the first trip. But you *have to* announce which output destination (modem, printer or disk) you have chosen when you pass by the keyboard for the second time.

"GOTO Keyboard" Rule: If you land on one of the spaces marked "GOTO Keyboard," go forward around the board until you reach the keyboard. On your first trip, this will help you; on your second, it will slow you down.

Riddle Rule: There's a riddle on the monitor. The answer to the riddle is scrambled on the keyboard. If you land exactly on "Riddle Space" or on the monitor, you can win two free turns by unscrambling the answer. You have to use all the letters on the keyboard. (Only the first person to guess the riddle—and land on the right space—can win the free turns. The answer to the riddle is on page 64; if you guess right, show it to everyone in the game. If you guess wrong, others can guess later.)

TO WIN: The first player to reach END wins. You must roll *exactly* the right number to land on END.

P·A·T·H


Color monitor—go ahead 4 spaces.
Memory Bank holiday today.
Family using monitor to watch "Donkey Golf"—lose 1 turn.
You win! Go to end.
No paper in printer—go back to keyboard.
Video games on paper? Silly. Lose 1 turn.
PRINTER END
MEMORY
No disk in disk drive—lose 1 turn.
One moment please—still loading...
You just erased your favorite game—go back 3.
DISK
END
You entered 28K program in 2K memory—start all over.
Binary Space—must roll 1 to move.
Your friend works for Atari—go ahead 2.
Phone rates just went up—must roll 4.
You reach friend's answering machine—lose 1 turn.
GOTO keyboard.
Spilled Gatorade on keyboard—lose 1 turn.
Computers work fast—go ahead 3.
Develop a "hacking" cough—go back 1.
New computer works great—go ahead 2.
Best game ever!
MODEM
END
No bugs—good job!
You built this computer yourself—go again.
Power failure—go back 3 spaces.

GAME BOARD ILLUSTRATION BY DANIEL PALAVIN

Priced for Kid-Size Budgets

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Discover the challenge and excitement ofsolving elaborate mysteries

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basic training

MAKE A FACE

BY JEFF NILSON

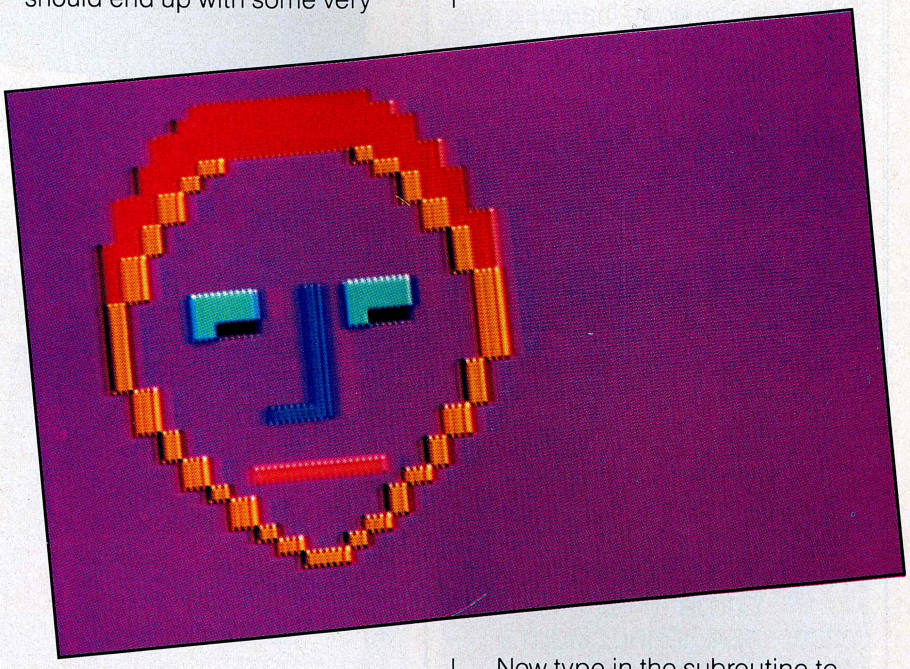
Every month, "Basic Training" will present you with a computer program that is offbeat and fun. The program is written so beginners can do it, but even if you're a computer expert we think you'll enjoy "Basic Training."

This month's computer program is written for an Apple machine with a color monitor. If you've got a Texas Instruments computer, send a self-addressed, stamped envelope to ENTER BASIC, CTW, 1 Lincoln Pl., NY, NY, 10023, and we'll send you the program for that machine. In the coming months, ENTER will run programs for Atari and Commodore computers. And we welcome your own adaptations of this program (see box, page 57).

What do the face of the Cheshire Cat in *Alice in Wonderland* and the face drawn by this month's "Basic Training" have in common? They both appear part by part, mouth first. "After watching it a minute or two, (Alice) made it out to be a grin," the story says. Poor Alice. Just when her croquet game is going badly, the Cheshire Cat is playing cat and mouth with her.

The face drawn by the computer has a big advantage over the Cheshire Cat's. It can change color—time and again. In fact, the Apple has 16 different colors you can program in for *each* face part. That means there are over 10 million different color combinations you can create. This program is set up so that you choose the color you want for each face by typing in a number from 0 to 15.

To see what the face looks like, simply go ahead and type in all the instructions in the order you see them here. If you want to know *what* you're telling the computer to do, and *how* it does it, read the explanations as you type in the instructions. In either case, you should end up with some very colorful faces...and watch out for those shifty eyes!



PHOTOS © RICHARD FRIED

Each section of our program that draws a part of the face is called a *subroutine*. Subroutines are small programs inside larger programs that do the same job over and over.

The subroutines in the "Make a Face" program are "called" by the "main loop" of the program. To call a subroutine in BASIC, you write GOSUB followed by the line number where the subroutine begins.

The Program Starts Here

Begin by typing these lines from the main loop.

```
5     DIM DS (20), DZ (20):
      HOME: GR
15    GOSUB 1200: REM:
      BACKGROUND:
```

Now type in the subroutine to color in the background.

```
1200  REM: :BACKGROUND
      COLOR: :
1205  HOME
1210  HTAB 1: VTAB 22: INPUT
      "ENTER BACKGROUND
      COLOR. (0-15)"; BC
1220  COLOR = BC
1230  FOR K = 0 TO 39
1240  HLIN 0, 39 AT K
1250  NEXT K
1260  RETURN
```

(continued on page 56)

Line 5 (above) saves slots in the computer's memory for the DATA that you will enter in lines 10005 and 10015 (see next page). Line 5 also sets the graphics mode of the Apple. Then line 15 (above) calls the subroutine at 1200, which lets you choose a background color. When the computer reaches line 15, the GOSUB 1200 tells it to jump to line 1200. You choose the background color for the face in line 1210. Then lines 1230, 1240, and 1250 tell the Apple to draw four horizontal lines in the color you chose. The computer draws the line down the screen from top to bottom. After the computer finishes looking at line 1260, it RETURNS to line 20 (see below). Whenever the computer RETURNS from a subroutine, it goes to the next line after the line that called the subroutine.

Enter the Mouth

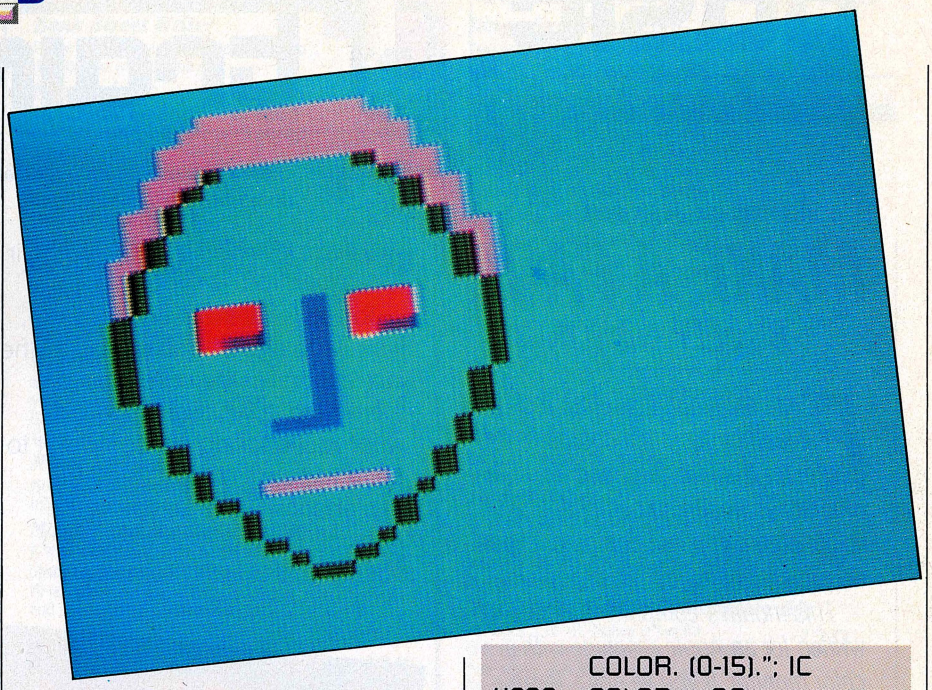
Next, type in this subroutine that will draw the mouth.

```
2000   REM: :GET MOUTH
       COLOR: :
2010   HOME
2015   HTAB 1: VTAB 22: INPUT
       "ENTER THE MOUTH
       COLOR (0-15).": MC
2020   REM: :DRAW MOUTH: :
2030   COLOR = MC
2040   HLIN 10, 15 AT 28
2050   RETURN
```

Add this line from the main loop:

```
20     GOSUB 2000: REM:
       DRAW MOUTH:
```

(Editor's note: Some Apple computers will flash an error message on the screen if you run this program in stages. Ignore the error message. It just means the machine is looking for "end"—the last line of the program—which you haven't entered yet.)



Now, type in this set of instructions that draws the nose.

```
3000   REM : :NOSE: :
3010   HOME
3015   HTAB 1: VTAB 22: INPUT
       "ENTER THE NOSE
       COLOR. (0-15)"; N C
3020   COLOR= NC
3025   VLIN 16, 24 AT 13
3030   HLIN 11, 13 AT 24
3040   RETURN
```

Next comes the line from the main loop to call the nose subroutine:

```
30     GOSUB 3000: REM : :
       NOSE: :
```

The nose is a backwards "L" drawn when the computer reaches lines 3025 and 3030 (above).

Now you enter the subroutine to draw the eyes, and then the line to call that subroutine.

```
4000   REM : :EYES: :
4010   HOME
4015   HTAB 1: VTAB 22: INPUT
       "ENTER THE OUTER EYE
       COLOR. (0-15)."; OC
4020   HOME
4025   HTAB 1: VTAB 22: INPUT
       "ENTER THE INNER EYE
       COLOR. (0-15)."; IC
4030   COLOR= OC
4040   FOR K = 1 TO 3
4050   HLIN 8, 10 AT 15 + K
4060   HLIN 15, 17 AT 15 + K
4070   NEXT K
4080   COLOR= IC
4090   HLIN 8, 9 AT 18
4095   HLIN 15,16 AT 18
4100   RETURN
40     GOSUB 4000 : REM:
       :EYES: :
```

This subroutine is longer than the nose and mouth subroutines because it includes *two* instructions. It draws the "eyeballs" at lines 4040 through 4070 and the "pupils" at lines 4090 and 4095.

What's a face without a border? Subroutine 5000 and subroutine 6000 combine to draw the edge of the face. Subroutine 5000 tells the computer to draw colored blocks. Subroutine 6000 contains the information that shapes those blocks into a face-like oval. So, first enter subroutine 5000.

(Read the type carefully. This is 1(1) and this is l(l).)

```
5000   REM : :DRAW FACE
       OUTLINE: :
5005   REM : : STARTING
       POINTS: :
```

```
5010    X1 = 4:X2 = 13:X3 =
        21:X4 = 12
5015    HOME
5020    HTAB 1: VTAB 22: INPUT
        "ENTER THE FACE OUT-
        LINE COLOR
        (0 -15).";FC
5025    COLOR= FC
5030    FOR I = 1 TO 16
5040    X1 = X1 + DS(I)
5050    X2 = X2 + DS(18 - I)
5060    X3 = X3 - DS(I)
5070    X4 = X4 - DS(18 - I)
5085    PLOT X1,19 - I
5095    PLOT X2,2 + I
5105    PLOT X3,18 + I
5115    PLOT X4,35 - I
5120    NEXT I
5130    RETURN
50      GOSUB 5000: REM :
        :FACE EDGE: :
```

Now, type in line 60 and subroutine 6000. This subroutine READS the DATA at line 10005 (below) into the array called DS (17), which is listed below (line 6040). It also reads the DATA at line 10015 into array DZ (9) which is also listed below (line 6070). An *array* is the organized part in the computer's memory that acts like a group of post office boxes. Each "box" in an array like DS (17) holds a 0 or a 1.

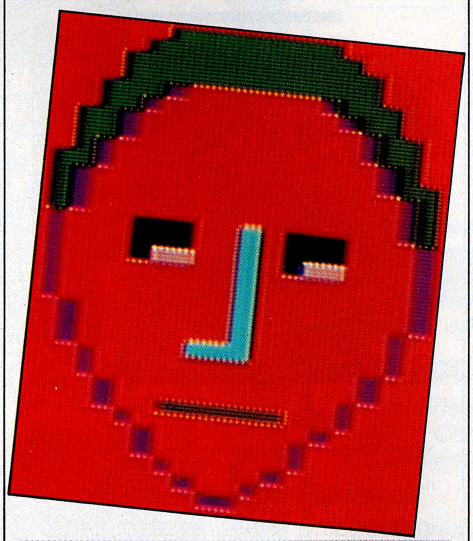
```
60      GOSUB 6000: REM
        :LOAD FACE AND HAIR
        DATA:
6000    REM : : LOAD HAIR AND
        FACE DATA: :
6030    FOR I = 1 TO 17
6040    READ DS(I)
6050    NEXT I
6060    FOR J = 1 TO 9
6070    READ DZ(J)
6080    NEXT J
6090    RETURN
10000   REM : : FACE DATA: :
10005   DATA 0,0,0,1,0,0,1,0,
        1,0,1,1,0,1,1,1,0
10010   REM : : HAIR DATA: :
10015   DATA 12, 9,7,5,4,3,3,3,3
```

How the Face Gets Its Curve

Here's how the face's outline is formed: Subroutine 5000 draws colored blocks in an oval shape, four colored blocks at a time. To get the curve of the face, sometimes the computer draws the blocks right above or below the blocks it just drew. Other times it draws the four blocks above or below AND *one space over* from the previous blocks drawn.

The 0's loaded by subroutine 6000 tell subroutine 5000 to print the blocks right above or below the last blocks drawn. The *1*'s tell the subroutine to draw them above or below AND one space over from the last blocks drawn. So *both* subroutines are necessary to draw the outline of the face.

If you want to keep the head bald, do not add subroutine 7000 below. If you like hair, enter line 70 and lines 7000 through 7070.



```
70      GOSUB 7000: REM :
        :DRAW HAIR: :
7000    REM : : HAIR: :
7010    HOME
7015    HTAB 1: VTAB 22: INPUT
        "ENTER THE HAIR
        COLOR (0-15).": HC
7020    COLOR= HC
7030    FOR J = 1 TO 9
7040    VLIN DZ(J), DZ(J) + 3 AT
        J + 3
7050    VLIN DZ(10 - J), DZ(10
        - J) + 3 AT J + 12
7060    NEXT J
7070    FOR DE = 1 TO 350:
        NEXT DE: RETURN
```

To liven up the face, enter subroutine 8000, which moves the eyes, and line 80. Lines 8020 and 8030 print the pupils in the eyeball color, erasing them. Then lines 8050 and 8060 redraw the pupils in their original color a couple of blocks over.

```
8000    REM : : MOVE EYES: :
8010    COLOR= OC
8020    HLIN 8,9 AT 18
8030    HLIN 15,16 AT 18
8040    COLOR = IC
8050    HLIN 9,10 AT 18
8060    HLIN 16,17 AT 18
8070    RETURN
80      GOSUB 8000: REM:
        :MOVE EYES: :
```

Finally, add lines 90 through 120. Line 110 lets you draw another face if you type "Y" (yes) at line 100.

```
90      HOME : FOR DE = 1 TO
        800: NEXT DE
100     HTAB 9: VTAB 22: INPUT
        "MAKE ANOTHER FACE?
        (Y/N)" : YN$
110     IF YN$ = "Y" THEN 15
120     END
```

Now, finally, type "run." The program will go into action.

Send Us Your Programs!

We'd love to see what you're creating for your computer. Send us a copy of a program you've done, an original game or a variation on the program in this month's "Basic Training." We'll print our favorites. If we choose your program, you'll get an ENTER T-shirt.

BUYING A COMPUTER

(continued from page 34)

will play some game cartridges, and will help you make a real start in learning to program. A more sophisticated computer—with as much as 64K memory—can now be bought for under $500 (the Commodore 64, for one example). Right now, no one is making games that require more than 64K—so that's as good as you need for gameplaying. But if you are interested in word processing, or business programming you may need a more expensive model.

Finally, you should ask, "How much computer do I get for my money?" With most systems today, peripherals like disk drives and modems can add hundreds to what you pay. Recently, new "complete package" systems were introduced by Coleco ("Adam"), Mattel ("Aquarius") and others. These systems offer computer *and* peripherals for under $1000. When you're buying, consider your options carefully. Remember that peripherals, while nice, aren't necessary for using the computer. As for package computers—they sound exciting, but they're new and no one knows how good they really are yet.

The Final Word

There are, as you can see, lots of factors that go into your decision. If your family is about to invest in a computer, though, it's in your interest to make sure you help them be knowledgeable about it. Any computer can be a pleasant surprise at first, when the box is unwrapped and it's waiting to be worked on. But if you take the care to choose well, your computer can be a pleasant surprise for you and your family over and over again.

BILL CAMARDA and his Timex/Sinclair 1000 reside in Port Jefferson, New York.

User Views

(continued from page 11)

can beat a round, but be unhappy because you didn't beat it by enough. This means the best strategy involves getting close to the threshold, then going for as large a chunk of the remaining screen as you think you can get away with. *Qix* is a test of greed. You can play it safe or play it risky, depending on the size of the shapes you create. Remember: a qix in the hand is worth two in the bush.

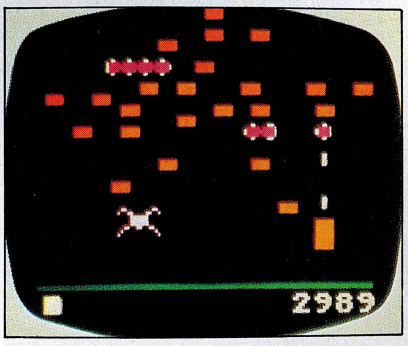
WRAP-UP

PHIL: This really is a beautiful game, and one of the best combinations of mental and physical dexterity I've ever played.

BERNIE: What more can I say but that I loved it? *Qix* creates a nice inner dialogue for the player.

CENTIPEDE

(Atari, 2600, $34.95; 5200, $39.95)

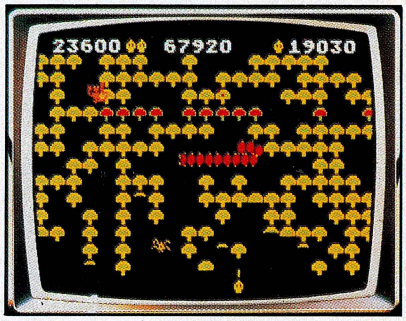


'Centipede' on the 2600

"An ultimate shooting gallery demanding coordination of hand, eye, and mind."—Bernie
"Too bad this game wasn't out last year."—Phil

Centipede is one of the wildest, most action-packed games for home play. It has laws that govern every aspect of play, but things happen so fast they are difficult to discover. This means the game is an open challenge to an inquiring mind.

No two games of *Centipede* will be exactly alike because the



The action-packed 5200 version

arrangement of mushrooms is random; also, it would be a dandy feat to copy your best pattern exactly, given all you have to monitor.

The home game is incredibly faithful to the coin-op version in the fury of its play action. There are plenty of targets in *Centipede* to keep action fans happy. Graphics, however, are another story. Mushrooms become bland rectangles, as do centipede segments. And you would never know your enemies are spiders, fleas and scorpions by looking at them here, either. The overly abstract graphics take some of the punch from the game's theme of "insects gone berserk."

WRAP-UP

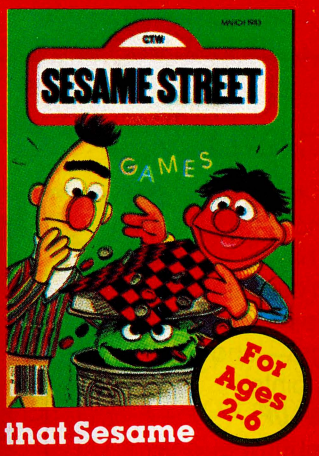
PHIL: I found that many coin-op strategies work on the Atari 2600 and on the 5200 version, so you know they are good translations of the original gameplay.

BERNIE: Yet, I missed the graphics so much that the game was a disappointment. And I'm usually much more interested in the experience of a game than its look.

PHIL: I like to play this version, but I'd much rather play *Centipede* on the 5200—that's a fantastic cartridge by comparison. A last

(continued on page 60)

ENJOY WITH SESAME STREET



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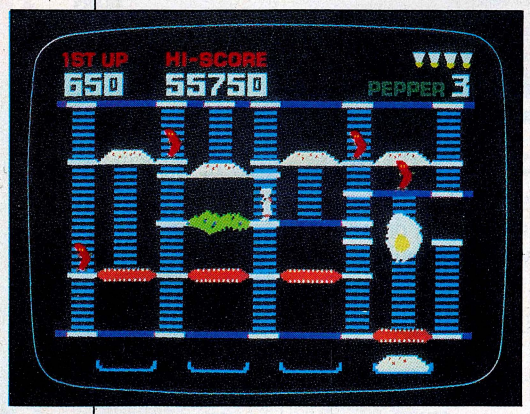
8SAD9

(continued from page 58)

thought: if you have a track ball controller, this is the game to use it on. Your scores will improve dramatically.

BURGERTIME

(Mattel, Intellivision, $34.95)



"Gameplay so good I got used to the graphics."—Phil
"My first impression was 'another ladder game.' I was wrong."
—Bernie

We applaud this first adaptation of a coin-op for Intellivision. Mattel has done so many sports simulation games that any decent arcade-action game for this system is welcome. That's particularly true when the game is as engaging as *Burgertime.*

Burgertime features seven mazes of ladders and walkways, and you need a different strategy for each one. Around each maze you see the makings for hamburgers: top and bottom buns, meat patties, lettuce, and slices of cheese. When you run your character across any of these ingredients, it drops down one level, knocking any other part below it down one level. The object is to keep lowering the parts of the hamburgers until you have formed four at the bottom of the screen. Because you have unlimited time to do this, you can take advantage of your enemies—three hot dogs and a fried egg!—and garner some bonus points.

WRAP-UP

PHIL: The hamburgers look somewhat blocky, and I think the game would improve with better visual rewards. Still, developing seven different patterns is interesting and the game has staying power.

BERNIE: I disagree about the graphics. I was very impressed with this translation from coin-op.

PHIL: What most impressed me about the game was playing it at the fourth speed level. Here, everything moves at a pace as challenging as I will ever need.

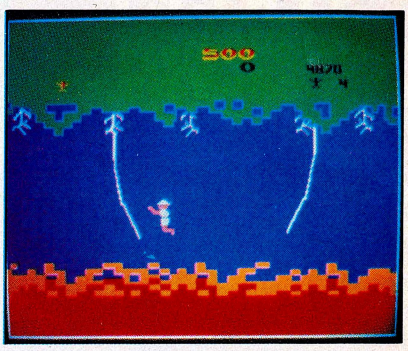
JUNGLE HUNT

(Atari, VCS, $34.95)

"A series of clever illusions, but you want more control."—Bernie
"Atari, you can do better."—Phil

There are four different scenes in this version of *Jungle Hunt,* and your goal is to get your character (Sir Dudley Dashly) through them all and rescue Lady P. before cannibals munch her for lunch. As in *Donkey Kong,* you must make the rescue before your bonus points run out. Otherwise, you lose one life. If you make it, you score the amount of bonus points remaining. Thus, *Jungle Hunt* turns out to be a game of keeping on the move.

Unfortunately, the game requires much less skill than one expects. It's mostly just reflex coordination. There is very little strategy. For example, in the first scene Dashly has nothing to do but leap from one swinging vine to the next, and



you can learn the necessary timing during the first game. Dashly has no enemies on screen (except gravity) and cannot move up or down on his vines. You can only control *when* he makes his jump. This is very unfortunate because the first scene has the game's best graphics.

The toughest part of the game comes in the third scene. Here, Dashly can do three things—move right and left, jump, or duck—in response to either a large or a small boulder rolling his way. This, we found, finally gives you enough strategic options and split-second decisions to make the game interesting. But what a let-down when you see the depressingly simple fourth scene: a single native dancing back and forth in the same spot. There is no way around him; you must jump over. We turned around and left.

WRAP-UP

PHIL: I thought the game was too much like *Donkey Kong,* but with half as much challenge.

BERNIE: Well, the game itself isn't like *Donkey Kong*—the scoring system is. It's more like *Pitfall.*

PHIL: But *Pitfall* has plenty of mental strategy to figure out. This doesn't.

BERNIE: True. But the fantasy of navigating three different environments is cute—swimming, running, swinging—and I suspect the game could appeal to the younger player.

pencil crunchers

VIDEO GAME WORD HUNT

BY LOIS CANTWELL

Hidden in this word square are the names of 25 video games and their manufacturers. The names may be spelled left to right, right to left, up or down or on a diagonal. All the names are listed to the right and we have circled one to get you started. NOTE: Some letters may be used more than once. See how high you can score!

ATARI
BALLY
DEMON ATTACK
DONKEY KONG
EYES
FRENZY
FROGGER
FRONTLINE
GALAGA
GORF
INTELLIVISION
JOUST
MEGAMANIA
MS PACMAN
NINTENDO
PACMAN
PENGO
PITFALL
Q*BERT
ROBOTRON
SEGA
SLITHER
TAITO
TURBO
ZAXXON

(Answers on page 64)

F R O N T L I N E S P R N T T L E
Q E R D E M O N A T T A C K F E K
T H I O K J T F E A S T R A E V B
P T M N A M C A P I T R E B Q X Q
A I E K T P B K K T M U I O P L H
V L N E N E A X C O P I R T F C X
P S E Y E M L G N O R T O B O R T
L I T K L L L L R I M O S P O P C
L U S O T N Y N I W R Y T G D U M
A X U N V B M J R V H G N J N I S
F R O G G E R N A K I E D F E R P
T M J C A L O Z T I P S U P T W A
I N B G A L A G A T B S I C N R C
P R E A X X T D C V S W D O I A M
U S R O X A B C M E G A M A N I A
N I K O N I O P R S T B E S R T N
Y Z N E R F N W E F R O G S L T E

INPUT

THE ENTER POLL

Here's your chance to win a t-shirt and help us plan future issues of ENTER. Fill out this questionnaire and mail it to us. We'll choose 50 of them at random, and send ENTER t-shirts to the winners. We really want to know what you think, so please be honest. Thanks!

Mail your questionnaire by OCTOBER 15 to:

INPUT
ENTER Magazine
CTW
1 Lincoln Plaza
New York, NY 10023

1. First, tell us about yourself.

Name_____

Street_____

City_____ State & Zip_____

Age____ Grade____

Male____ Female____ T-Shirt size S____ M____ L____

Where did you get this issue of ENTER?

____ At a newsstand ____ In the mail

____ At a computer store

____ Other (Please explain)_____

2. Now, tell us what you thought about ENTER's regular departments:

	I liked it	OK	I didn't like it
Bits_____	____	____	____
User Views_____	____	____	____
Q & A_____	____	____	____
BASIC Training (Programming)____	____	____	____
Random Access: Kids' Column____	____	____	

3. There are some special features this month. What did you think of:

	I liked it	OK	I didn't like it
Mean Screen Machines_____	____	____	____
Reel to Real_____	____	____	____
Arcade Arrivals____	____	____	____
The Making of a Chip ____	____	____	____
Buying a Computer ____	____	____	____
Video Disc Mysteries ____	____	____	____
Quiz: Hacker Talk____	____	____	____

4. We'd also like to know about you and computers and video games:

A. Does your family own a home computer?

Yes____ No____ Which one?_____

B. Do you have a color monitor on your computer?

Yes____ No____

C. Does your family own a home video game system?

Yes____ No____ Which one?_____

D. Do you use a computer in school? Yes____ No____

Which one?_____

E. If you have ever used a computer, tell us what you did:

____ Programming ____ Homework

____ Games ____ Graphics

____ Other (Please explain)_____

F. My favorite electronic games are:

Home_____

Arcade_____

5. And, finally: In future issues of ENTER, I'd like to read about:_____

_____

_____

_____

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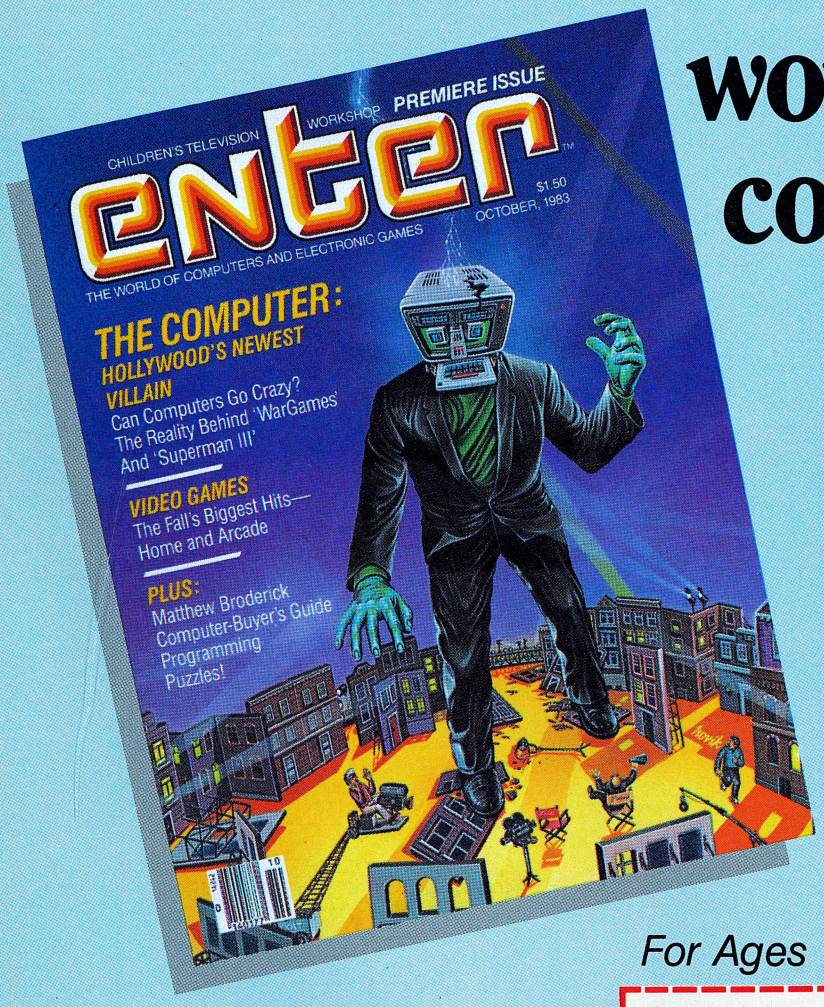

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ADDRESS _____

CITY _____ STATE _____ ZIP _____

LIST BILLING NAME AND ADDRESS IF DIFFERENT FROM ABOVE.

_____

_____

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4HEAZ

next

HERE'S WHAT'S COMING IN NOVEMBER'S ENTER:

ESCAPE TO ADVENTURE: Computer adventure games let you journey to strange planets and solve multi-level mysteries. ENTER talks with designers and devoted game players, reviews some of the top games, and then challenges you to an adventure of your own: Can you defeat the alien ice demon, Glich?

DIGITAL DANCING: Find out how computer graphics are changing the world of ballet and modern dance.

LIGHT FANTASTIC: The true story of how laser beams and a joystick saved a young girl's life.

GAME PLAN: Our new department shows you how to improve your score on popular video games.

PLUS: Computer-created mazes, puzzles, programming and much more!

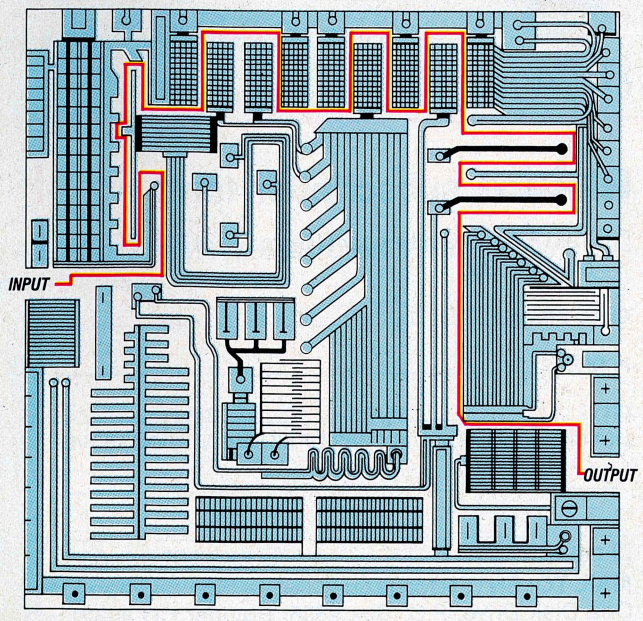
THANKS: A special "thank you" to researcher Brian Allen for his help with the programming feature in this issue.

answers

DATA PATH *(page 52)*

The answer to the riddle, "What snack do you serve at a combination computer/pool party?" is CHIPS & DIP.

THE A-MAZE-ING CHIP *(page 44)*



WORD HUNT *(page 61)*

F	R	O	N	T	L	I	N	E	S	P	R	N	T	T	L	E
Q	E	R	D	E	M	O	N	A	T	T	A	C	K	F	E	K
T	H	I	O	K	J	T	F	E	A	S	T	R	A	E	V	B
P	T	M	N	A	M	C	A	P	I	T	R	E	B	Q	X	Q
A	I	E	K	T	P	B	K	K	T	M	U	I	O	P	L	H
V	L	N	E	N	E	A	X	C	O	P	I	R	T	F	C	X
P	S	E	Y	E	M	L	G	N	O	R	T	O	B	O	R	T
L	I	T	K	L	L	L	L	R	I	M	O	S	P	O	P	C
L	U	S	O	T	N	Y	N	I	W	R	Y	T	G	D	U	M
A	X	U	N	V	B	M	J	R	V	H	G	N	J	N	I	S
F	R	O	G	G	E	R	N	A	K	I	E	D	F	E	R	P
T	M	J	C	A	L	O	Z	T	I	P	S	U	P	T	W	A
I	N	B	G	A	L	A	G	A	T	B	S	I	C	N	R	C
P	R	E	A	X	X	T	D	C	V	S	W	D	O	I	A	M
U	S	R	O	X	A	B	C	M	E	G	A	M	A	N	I	A
N	I	K	O	N	I	O	P	R	S	T	B	E	S	R	T	N
Y	Z	N	E	R	F	N	W	E	F	R	O	G	S	L	T	E

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